Fulton Hogan

Foxground and Berry Bypass

Periodic and Pre-Operational Construction Compliance Status Report

Report 6
1 May 2017 – 30 September 2017

Contents

Appendices

Details of Revision and Amendment:

Document Control

The most current version of this report will be available on the Fulton Hogan database for all project personnel. Distribution of this report will be made through the Foxground and Berry Bypass project document control system 'iTwo'.

The environmental management team will maintain, review and update this report on a six monthly basis.

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4	RMS Environmental Officer	30/09/17	Michelle Toms
5	DP&E endorsed Environmental Representative (ER)	30/09/17	Toby Hobbs
6	Department of Planning & Environment	30/09/17	Michael Young

Plan Approved By:

Michael Philips-Ryder — Project Director

Jacob Cooper — Environment Manager

Amendment

Each new revision to the report will be distributed to all registered copyholders with an instruction that the superseded copy be destroyed or marked as superseded.

The revision number is included at the end of the document number, which is noted on each page. When amendments occur, the document or relevant section will be reissued with the revision number updated accordingly.

The Project Manager or Environmental Manager will approve amendments by initial in the Approval column below.

The following provides a record of amendments made to this document:

Revision	Date	Description	Page	Prepared by	Approved
0	7 September 2017	Draft for internal review	All	James Alchin	
1	22 September 2017	Draft submitted for approval to RMS & ER	All	Jacob Cooper	
2	30 September 2017	Final Submitted	All	Jacob Cooper	
3	13 October 2017	Minor changes requested by DP&E	All	Jacob Cooper	

Abbreviations

CEMP	Construction Environmental Management Plan
CPESC	Certified professional in erosion and sediment control
CTP	Compliance Tracking Program
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment Protection Licence
ER	Environmental Representative
DP&E	Department of Planning and Environment MCoA
NBN	National Broadband Network
NSW	New South Wales
POEO Act	Protection of the Environment Operations Act 1997
OoW	Office of Water
PPR	Preferred Project Report
SEPP	State Environmental Planning Policy
SoC	Statement of Commitments
SWTC	Scope of Work and Technical Criteria
TMP	Traffic Management Plan
RBL	Rating Background Level
ROL	Road Occupancy Licence
NCR	Non-conformance report

1 Introduction

The Foxground and Berry bypass will provide a four-lane divided highway (two lanes in each direction) with median separation for 11.6 kilometres of the Princes Highway between Toolijooa Road near Foxground and Schofields Lane south of Berry. The project crosses both Kiama and Shoalhaven local government areas.

Key concept design features include:

- Approximately 11.6 kilometres of new highway, including bypasses of the Foxground bends and the Berry township
- Interchanges at Toolijooa Road, Austral Park Road, Tindalls Lane and the northern and southern interchanges for Berry
- Junction arrangements at Schofields Lane and Gembrook Lane which enable both northbound and southbound access to the highway
- A cutting about 25 metres deep at Toolijooa Ridge, bypassing the Foxground bends
- Six lanes through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres, providing two lanes and a climbing lane in each direction
- Three bridge crossings at Broughton Creek and a bridge at Berry
- An upgrade and extension of Austral Park Road
- A new roundabout at the junction of Woodhill Mountain Road and the existing Princes Highway
- A diversion of Town Creek into Bundewallah Creek
- Proposed local road closure at North Street
- Victoria Street to remain open with a two-way connection between Queen and Victoria streets and a southbound on-ramp south of Victoria Street
- New property accesses and access roads (left-in/left-out only for direct property access to the upgraded highway) and
- Wildlife crossings (rope bridges and underpasses) to maintain existing wildlife corridors.
- Benefits associated with the Project include:
- Improving road safety on the Princes Highway and local road network
- Reducing total crashes on the Princes Highway in the project area by an estimated 64 per cent
- Improving road safety through less interaction between traffic and pedestrians in the town of Berry
- Improving the efficiency of the Princes Highway between Toolijooa Road and Schofields Lane
- Reducing travel time by an estimated seven (7) minutes
- Supporting regional and local economic development
- Improving flood immunity and
- Improving wildlife crossings.

The project is being delivered through a 'design and construct' contract process. Fulton Hogan was appointed by RMS on 11 July 2014 to deliver the project.

Further details on the project background can be sourced from the project website at (http://www.rms.nsw.gov.au/projects/south-coast/foxground-berry-bypass/index.html)

1.1 Project environmental assessment and approval

The Foxground and Berry bypass, Princes Highway upgrade was approved by the NSW Minister for Planning and Infrastructure on 22 July 2013. The project has been assessed as a transitional project under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Minister's conditions of approval have been provided to Roads and Maritime Services to guide the detailed design, construction and operation of the project.

To facilitate the assessment and determination of the Project, an Environmental Assessment was developed and issued in November 2012. This assessment (and associated specialist studies) detailed the key environmental aspects of the project and recommended management and mitigation measures to mitigate environmental risks during construction and operation of the infrastructure. The Foxground and Berry bypass environmental assessment was exhibited for 34 days from Wednesday 14 November 2012 to Monday 17 December 2012 and a total of 254 submissions were received during the exhibition period.

A Submissions and Preferred Project Report (PPR) was developed and placed on public exhibition in response to the submissions received during the Environmental Assessment consultation period. This report responded to the main issues raised during the consultation period, described amendments made to the project design since the exhibition of the Environmental Assessment, and provided additional assessment of relevant environmental issues raised in the submissions and amendments made in the public consultation phase.

Both the Environmental Assessment and Submissions and Preferred Project Report were assessed by the NSW Department of Planning and Infrastructure.

In addition to the above approval, Fulton Hogan have also acquired an Environment Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO Act) to facilitate construction activities. The EPL was issued 29 August 2014.

The Project Construction Environmental Management Plan (CEMP) and sub-plans were approved by the Department of Planning and Environment on 19 September 2014.

The Department of Planning and Environment approved the following project documents on 27 October: the Biodiversity Offset Strategy; the Ecological Monitoring Program; the Water Quality Monitoring Program; the Urban Design and Landscape Plan; and the Community Consultation Strategy.

Following the above approvals, RMS formally advised the Department of Planning and Environment that construction would commence on 28 October 2014 and the CEMP has been implemented since this date.

On 28 January 2015, the Department of Planning and Environment approved the modification of Condition C13. This modification removed the section which prohibited an increase to blasting limits application where a non-aboriginal heritage item existed.

On 9 March 2015, the Department of Planning and Environment approved increased blasting limits for the Toolijooa ridge earthworks cuts. A further approval to increase blasting limits at cut 3 and cut 4 on the FBB project was also approved.

Condition C4(e) of the project approval was modified by DP&E on 31 July 2015 to enable out-of-hours work as approved through the project Environmental Protection Licence . This modification was requested to streamline the out-of-hours works approval process without reducing the level of consideration required for out-of-hours work. Further, Condition C6 which previously detailed the Out of Hours work request process was removed as it was no longer required due to the modification to C4(e). The change was supported by NSW EPA, Kiama Municipal Council and Shoalhaven City Council.

One major consistency assessment has been completed on the project to date where the abutment B at Broughton Creek crossing 3 was designed to sit 34 metres closer to the creek in comparison to the concept design. This increase in construction footprint and scope also includes re-routing of an emphemeral drainage line into Broughton Creek. This consistency assessment was approved by RMS and the Project ER on 14 Decemeber 2015.

Condition C15 of the project approval was modified by DP&E on the 3 July 2017 to enable works within specified heritage sites after seeking written approval from the Secretary. In light of this approval from the Secretary was given on 3 July 2017 to work within heritage site G2B H25 to construct a residents driveway.

On 29 September 2017, the Department of Planning and Environment approved a modification to conditions C15 and C16 to align with the original project approval.

1.2 Purpose of this report

The purpose of this report is to provide a summary of the outcomes and actions obtained through the implementation of the project Compliance Tracking Program required under the Minister's Condition of Approval (MCoA) B29.

This compliance tracking report provides a review of compliance for the five month period between 1 May 2017 and 30 September 2017. As specified in B29, a pre-operational compliance review should be completed one month prior to operation of the project. This report fulfils this requirement with commencement of operation announced for 31 October 2017.

Minister's Condition of Approval (MCoA) B29 states:

"The Proponent shall develop and implement a Compliance Tracking Program to track compliance with the requirements of this approval. The Program shall be submitted to the Director General for approval prior to the commencement of construction and shall be applied during construction and for a minimum of one year following commencement of operation. The program shall include, but not necessarily be limited to:

(a) provisions for the notification of the Director General of the commencement of works prior to the commencement of construction and prior to the commencement of operation of the project (including prior to each stage, where works are being staged);

(b) provisions for periodic review of project compliance with the requirements of this approval and the documents listed under Condition A1, including the Statement of Commitments;

(c) provisions for periodic reporting of compliance status against the requirements of this approval and the documents listed under Condition A1, including the Statement of Commitments, to the Director General including at least one month prior to the commencement of construction and operation of the project and at other intervals during the construction and operation, as identified in the Program;

(d) a program for independent environmental auditing in accordance with /SO 19011:2003 - Guidelines for Quality and/ or Environmental Management Systems Auditing;

(e) mechanisms for reporting and recording incidents and actions taken in response to those incidents;

(f) provisions for reporting environmental incidents to the Director General during construction and operation; and

(g) procedures for rectifying any non-compliance identified."

During the reporting period the Foxground and Berry Bypass has been compliant to the conditions of approval. Appendix A of this report contains detailed information on the status and compliance of each specific condition for the Foxground and Berry Bypass.

2 Construction activities during reporting period

Project works are proceeding in accordance with the construction program. During the reporting period about 10% of the days were wet days. The total rainfall received on the project was significantly lower than the long term average. During this dry period production was at a high with environmental focus on closing out areas and dust mitigation measures.

To date the project is tracking at an overall 88% completion rate with outstanding works consisting of landscaping, property works and local roads. The remaining work along the main alignment consists of laying the final wearing coarse pavement, this will see the alignment in its final configuration with commencement of operation scheduled for 31 October 2017.

2.1 Demolition and property adjustment

Demolition works are complete. Property adjustments works have started and are continuing in all areas. They will be completed consistent with the construction programme.

2.2 Utilities adjustments & diversions

FBB continued to construct utilities and service adjustments. The general construction progress for services is:

- Electrical services relocations – 100% complete
- Telecommunications – 100% complete
- Sewer and water – 100% complete
- New street lighting installations started in the reporting period and are 80% complete

2.3 Fencing

Boundary fencing is mostly complete on the project. The exceptions are tie-in fencing to new property access points, fencing that is yet to be agreed under private property works and fauna fencing around fauna passage culverts.

Temporary fencing is maintained and installed around sensitive areas, heritage protection zones and maintained exclusion zones.

2.4 Traffic

Since May 2017 the project has carried out 2 major traffic switches including the opening Berry bypass where the project saw the alignment in its full configuration and taking all major traffic out of the much safer Berry.

Construction work is planned to avoid the need for traffic control. This is to ensure that delays are minimised to public motorists. Travel times between Tannery Road and Toolijooa Road are monitored on a daily basis to ensure a maximum travel time of ten minutes is not exceeded, within the reporting period this stretch of the project operated at its operational speed due to the completion of all median works from Toolijooa to Berry Bridge, however the occasional speed reduction occured in small work areas associated with maintenance and defects.

Average travel time to date:

- North bound – 5:02
- South bound – 5:10

Each traffic control setup is arranged to adhere to the Traffic at Work Site's Manual. To date the project has had 332 Traffic Control Plans (TCP's) designed and approved for use on site. These are regularly updated to ensure that they are relevant to the work occurring on site.

The current Road Occupancy Licences being used on site are.

- TMC 530171 EXP 02.11.17
- TMC 736752 EXP 29.09.17
- TMC 755138 EXP 02.11.17
- TMC 755144 EXP 02.11.17
- TMC 755154 EXP 01.11.17

Traffic control was used at a number of locations on the Princes Highway and adjoining side roads where speed reductions and detours through local roads were utilised for both worker and public safety.

2.5 Drainage

Drainage works continued well with favourable weather conditions. A summary of progress is detailed below:

- Transverse drainage: about 100% complete
- Longitudinal drainage: about 99% complete
- Overall Drainage: about 99% complete.

Figure 2-1: Final drainage on the project being installed at Queen St roundabout

2.6 Structures

The project includes the construction of 12 new bridges which cross creeks, floodplains, local roads and side roads. All 12 bridges have been completed, with Bridge 12 receiving its furniture during the reporting period.

There are six structural culverts on the project which provide connectivity for vehicles and wildlife under the new highway. During the reporting period, all culverts have been completed with SC03 awaiting its final fauna furniture to be completed.

Figure 2-2: Berry Bridge open to traffic in both northbound and southbound lanes

2.7 Roadworks

Works are progressing well on design earthworks and roadwork. Important milestones throughout the reporting period included:

- Opening of the Berry Bypass; diverting all highway traffic around the township of Berry.
- Decommissioning of Toolijooa and Gate 2 compounds, leaving Austral Park, the site office and Gate 19 compounds the last of the construction footprint remaining.
- Commencement of the final wearing coarse pavement.

Figure 2-3: Final wearing coarse pavement being placed in cut 9 to cut 12

2.8 Landscaping

The project has made good progress on landscaping works in the reporting period. It is a key project goal to have established landscaping at the time of the project opening to traffic. With dry and windy conditions for the majority of the reporting period, focus on consistent watering of landscaped areas has helped the high survival rates through these tough conditions.

The general update of progress is:

- Topsoil - 95% completed
- Hydro mulch - 90% completed
- Planting - 80% completed

The full time landscaping crews have planted some important areas around Queen Street and in other areas close to domestic residences, bridge abutments and general rural plantings.

The key focus for upcoming works is to complete all landscaping along the plant the North street embankment on both sides providing important visual screens to both residents and motorists.

Figure 2-4: Progressive watering of landscaped area at the southern Berry interchange

2.9 Sediment basins

The number of sediment basins on the project reflects construction progress. The risk footprint is continually decreasing as the works progress and areas are stabilised.

At the start of the reporting period there were 12 sediment basins in disturbed catchments. At the end of the reporting period there were 7 sediment basins within disturbed catchments. 5 catchments were rehabilitated within the reporting period. This is a positive indication that the project is continuing to reduce the environmental risk footprint as construction progresses.

Since the start of construction until the end of this reporting period there has been an 90% reduction in the number sediment basins. This generally means that about 95% of the overall disturbed footprint of the project has now been rehabilitated.

With regard to sediment basin management, the project continues to work diligently at treating and discharging stored site water back into the environment as efficiently as possible. The table below illustrates the timeframe that sediment basins have been discharged.

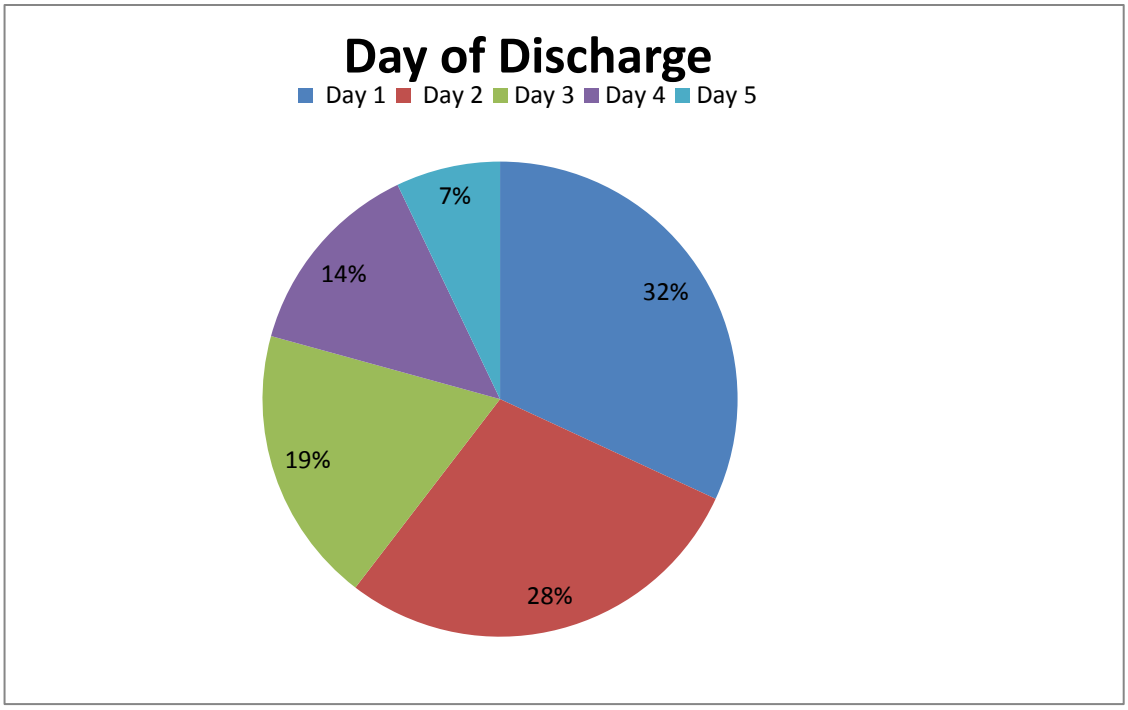

Figure 2-5: Sediment basin discharges in the five day period after rainfall

2.10 Noise mound construction

Construction of the Berry noise mound (North Street) has been prioritised in the construction program. The early construction of the noise mound reduces the potential acoustic and visual impacts of construction on both the residents of North Street and the wider community.

There are three earth mounds in the project design which provide visual screening and noise attenuation. The progress of those noise and visual mounds is as follows:

- North street noise mound: 98% complete. A small earth section and some shaping at the northern end and landscaping remains to be completed.
- Miller farm: the earth mound is 100% complete.
- Huntingdale Park: the earth mound is 100% complete. A masonry barrier is yet to be built on top of the mound on one section.

2.11 Temporary works

The project requires temporary works to allow for safe and efficient construction of the Foxground and Berry bypass. In the reporting period this included the use of temporary side roads, services diversions, driveway accesses, light vehicle tracks and temporary bridges.

During the reporting period the project made important progress in rehabilitating areas of temporary works in accordance with updated landscape plans. Temporary works areas that have been rehabilitated include:

- Removing temporary bridge structure crossing Broughton Mill Creek
- Temporary creek crossing at Bridge 6

- Rehabilitation of Toolijooa and Gate 2 processing yards

The project is continuing the rehabilitation of all ancillary sites left on the project with scheduled completion in late October 2017.

Figure 2-6: Removal of the temporary bridge structure crossing Broughton Mill Creek completed

3 Environmental management system overview

3.1 Environmental Management System certification

The overall Environmental Management System (EMS) for the Project is described within the Construction Environmental Management Plan (CEMP) and relevant sub plans. The EMS for the Project has been prepared to comply with the requirements of AS/NZS ISO 14001 Environmental Management Systems.

The Fulton Hogan EMS is periodically audited by external auditors to ensure compliance with ISO 14001. The Fulton Hogan EMS is currently certified and the expiry date of the certification is 14 September 2018.

3.2 Environmental management framework

The framework of the environmental management documents has been designed to comply with the requirements of ISO 14001 and to be consistent with the Guidelines for the Preparation of an EMP (DP&I 2004).

The CEMP comprises relevant sections from Fulton Hogan's Corporate Management System as well as a number of supporting documents (i.e. issue specific environmental sub plans) providing more detailed environmental management specifications.

3.3 Construction Environmental Management Plan

The CEMP is the key management tool in relation to environmental performance during the design and construction phases. The CEMP outlines Fulton Hogan's approach to minimising and managing environmental risks associated with the construction phase of the project. The CEMP is a dynamic document that is reviewed and amended to incorporate additional requirements as required, including changes to the project team, organisational structure and responsibilities or as improvements to procedures and methodologies develop.

The CEMP has been prepared in accordance with a number of guidelines including:

- Guideline for the Preparation of Environmental Management Plans (DP&I, 2004);
- RMS Specification G36 – Environmental Protection (Management Systems);
- ISO 14001:2004 – Environmental Managements Systems; and
- ISO 19011:2003 – Guidelines for Quality and/or Environmental Management Systems Auditing.
- NSW Minister for Planning Conditions of Approval (MCoA);
- EA and PPR Statement of Commitments; and
- Environment Protection License (EPL) requirements.

The CEMP was approved by the Department of Planning and Environment in accordance with MCoA B35 on 6 June 2014.

Detailed environmental management sub plans have been prepared on key environmental elements identified for the Project through the environmental assessment and approval process. They document the aspects, impacts, safeguards and monitoring requirements for each key environmental element, nominate who is responsible for implementing controls and note the frequency/timing of implementation.

The CEMP and sub-plans have been recently reviewed and endorsed by the Project ER, dates of revision for the plans are detailed in table 3-1.

Plan Name	DP&E Approval Date	Consistent with MCOA	Latest revision date
Construction Environmental Management Plan	06 June 2014	Yes	Rev H September 2017
Flora and Fauna Management Sub Plan	27 May 2014	Yes	Rev G May 2017
Heritage Management Sub Plan	13 May 2014	Yes	Rev F September 2017
Noise and Vibration Management Sub Plan	06 June 2014	Yes	Rev G September 2017
Soil and Water Quality Management Sub Plan	06 June 2014	Yes	Rev F September 2017
Air Quality Management Sub Plan	26 April 2014	Yes	Rev G September 2017
Construction Waste and Energy Management Sub Plan	29 April 2014	Yes	Rev H September 2017

Table 3-1: CEMP and sub plans consistency with MCoA and ER review dates

3.4 Compliance auditing

Regular auditing of the management system is completed during construction. Auditing includes:

- Internal compliance audits undertaken by Fulton Hogan
- External compliance audits undertaken by the Environmental Representative and RMS appointed auditors.

The intent of these audits is to identify opportunities for improvement and any system non-conformances during the course of construction so appropriate corrective actions can be implemented in a timely manner.

One external audit undertaken by the ER occurred in the reporting period on 29 August 2017, this audit focussed on progress and implementation of landscaping on the project. The audit found one observation of concern which has been addressed and deemed closed.

The project CPESC, Strategic Environmental and Engineering Consulting (SEEC) is also engaged to regularly conduct audits of site documentation and implementation of progressive erosion and sediment control plans in order to ensure high levels of site controls are maintained.

4 Environmental Performance

The project continued to implement and maintain a high standard of environmental controls during the reporting period. Controls were planned and executed to industry best practice standards.

The project's environmental performance is reviewed and measured by regional RMS, FBB ER, NSW EPA, NSW Department of Primary Industries - Fisheries and NSW Office of Water.

Regional RMS environmental staff reviewed the project 9 times in the reporting period. Those inspections gave the project eight 'green' and one 'amber' ratings. According to the RMS assessment standards the green rating indicates the 'site demonstrates good environmental management with no action required to avoid environmental harm'.

Fulton Hogan held the six monthly environmental review group meeting (ERG) on 19 September 2017.

4.1 Effectiveness of environmental controls

Effectiveness of environmental controls is evaluated by industry trained environmental engineers and scientists. Controls are planned prior to ground disturbance and installed before works start.

Environmental controls have been designed and installed in accordance with industry best environmental practice. External specialist consultants are engaged periodically to provide specialist reviews and audit the effectiveness of installed controls. In addition to this, all controls are inspected weekly as a minimum, during and after rainfall events.

Site controls are reviewed and reinforced in advance of predicted heavy rainfall events. Prior to long weekends and shutdown periods extra controls are installed to make sure they are suitable for the time that workers are offsite.

Maintenance of controls occurs regularly during construction. Maintenance ensures controls are functioning properly and are fit for purpose.

In the reporting period, all erosion and sediment controls performed well during adverse weather. This minimised potential impacts on receiving catchments and adjacent sensitive receivers.

4.2 Environmental initiatives

The Foxground and Berry bypass construction team has adopted a 'Beyond Compliance' approach to the project. The aspirational goal for the project team is to leave a community legacy built on 360 degrees of excellence. This philosophy promotes a positive culture of excellence whereby the project aims to exceed the contract and legal requirements to create a legacy that all associated with the project will be proud of.

The 'Beyond Compliance' strategy has led to the development of goals for each construction zone to achieve during the project.

During the reporting period the project achieved one of the stage two goals, including:

- Conduct a site trial of alternative flocculants with support from RMS and EPA
- ecotoxicology testing on treated sediment basin water has passed
- Assess the effectiveness of the flocculent

- Assess the effectiveness of the flocculent in a passive treatment system

This trial is complete with finalisation of the data and report to be completed before project completion.

Figure 4-1: From left to right: Samples taken from batch basin vs HES Basin after rain event

Figure 4-2: HES Basin looking from the fore-bay across the spreader bar and down to the decanting system after rain event

Environmental monitoring

The Foxground and Berry bypass is undertaking a range of environmental monitoring to review the environmental effects of the project. The results of these monitoring activities are used to establish trends and drive improvements.

These results of the monitoring programs are described in this section.

4.3 Water quality

In accordance with approval condition B16 the project has developed a Water Quality Monitoring Program has been developed and was approved 27 October 2014.

The approved *'Water Quality Monitoring. Surface Water Monitoring Plan'* (June 2014) sets out the requirements for surface water quality monitoring.

In the reporting period there were 2 surface water monitoring events triggered on the project, these were:

- June 2017 event 24: about 30mm of rainfall recorded. Report contained in Appendix B of this report.
- August 2017 event 25: about 15mm of rainfall received. Report contained in Appendix B of this report

4.4 Flora and fauna

In accordance with approval condition B9 the project has developed an Ecological Monitoring Program approved on 27 October 2014.

As part of the monitoring program, aquatic monitoring was undertaken twice in the reporting period with session 2 of autumn and session 1 of spring completed. Weed monitoring was also completed in late September.

The Grey-headed Flying Fox (GHFF) camp situated at Broughton Mill Creek remained in that location until late August when observations saw the camp naturally migrated away from the area. With the presence of the GHFF camp an amendment to the FFMP was approved by DP&E which incorporated a GHFF management plan which was implemented in the reporting period.

Works are progressing on the installation of fauna underpasses and aerial fauna crossings for arboreal mammals. Fauna fencing along the alignment is almost complete with small areas to be completed.

Figure 4-3: Fauna furniture installation at SC04

4.5 Heritage

There were no unexpected finds on the project in the reporting period. Significant planning has gone into the construction of a property access within the G2B H25 site. Works have been approved by the Secretary (addressed in section 1.1) with commencement of work to start in early October.

4.6 Air quality

Ambient air quality monitoring was undertaken in accordance with the Construction Air Quality Management Sub-plan. All results for the period had an average below the 4g/m² dust level.

Appendix D of this report shows the air quality monitoring results for the reporting period.

4.7 Noise and vibration

Attended noise monitoring was undertaken during normal construction hours monthly and during approved out of hours works. The recorded levels were consistent with the anticipated levels as described in Appendix A of the approved Noise and Vibration Management Plan. Records of noise monitoring within the reporting period can be found on the project website http://www.fultonhogan.com/news-resources/management-plans-reporting/foxground-berry-bypass-nsw/.

Attended vibration monitoring was conducted in response to community enquiries and on all occasions levels were within acceptable parameters. Those parameters are described in the approved Noise and Vibration Management Plan. See table 4-1 for the summary of vibration monitoring recorded within the reporting period.

Date	Type of building	Vibratory work	Peak particle velocity (mm/s)	Frequency (Hz)	Compliance Criteria
12/07/2017	Residential Structure (Non-heritage)	18T Smooth drum roller, 17T Padfoot roller. Distance from receiver 90m	0.30	25	<25mm/s
23/08/2017	Residential Structure (Non-heritage)	15T Smooth drum roller. Distance from receiver 40m	0.52	25	<25mm/s
25/09/2017	Residential Structure (Non-heritage)	15T Smooth drum roller. Distance from receiver 40m	1.98	25	<25mm/s

Table 4-1: Vibration monitoring records

5 Community complaints

In accordance with MCoA B31, a complaint management system has been established on the project to document community consultation including enquiries or complaints during construction. Table 5-1 demonstrate the four mechanisms that have been established to facilitate the lodgement of enquiries and complaints:

Tool	Details
Project information line (24-hour toll free)	The project information line (1800 506 976) is a 24hour toll free telephone number allowing the community to contact the community relations team at all times when work is being carried out on site, including out of hours work. Outside of working hours, a recorded message with voicemail is available.
Email address	The email address (foxgroundandberrybypass@fultonhogan.com.au) is monitored by the community relations team for incoming emails during business days.
Postal address	The postal address (PO Box 353 Berry NSW 2524) is monitored by the project team for incoming letters.
Website	The RMS Foxground and Berry bypass project website (www.rms.nsw.gov.au/fbb) includes the contact tools and will be updated regularly to have the latest information about the project.

Table 5-1: Community contact information

The telephone number, postal address and email address was published in newspapers circulating the local area before construction started. The details are included on all project material published to the community and they are also available on the project website in accordance with MCoA B31.

The project will continue to respond to and manage complaints made by stakeholders in accordance with AS-ISO 10002-2006 Complaints Handling. This system will be in place until eight weeks after the date of construction completion.

5.1 Number and types of complaints

During the reporting period, the community relations team logged 358 events, including telephone calls, meetings, emails, letters, door-knocks, and visits to the project display centre these are shown in table 5-2. Only 3 complaints made during the reporting period, a summary of these complaints can be found in the following table:

Date	Type of complaint and response	Status
19 June 2017	Noise complaint Woodhill Mountain Road Complainant called about work waking her up at 7:30am. Fulton Hogan advised the caller of the approved construction hours, Fulton Hogan notified EPA on the potential complaint.	Closed
July 2017	Two North Street residents complained about the operational noise of the Berry bypass	Closed

	Fulton Hogan and RMS addressed both complainants and advised that the operational noise will be reduced once temporary configuration has been removed and final wearing coarse is paved.	

Table 5-2: Information on community complaints

5.2 Community engagement initiatives

Ongoing consultation with nearby residents about construction activities occurred between 1 May and 30 September 2017. During the reporting period the Berry bypass was opened to traffic with media events and a community celebration walk.

Figure 5-1: Berry Bridge opening day with new alignment on display to public

The community celebration walk was held on Sunday 18 June. Around 6,000 community members attended the celebration. There was an information tent at the event, where many people visited to ask questions about the upcoming Berry bypass.

The community display centre at 59 Woodhill Mountain Road was closed on Friday 25 August. The community relations manager is available for meetings on request and is contactable on the project information line and email.

A project update was distributed to around 3,000 properties in June 2017. This update included a map showing the opening of the berry bypass and information about the construction of Woodhill Mountain Road roundabout.

Nine notification letters were distributed to nearby residents and the community about traffic changes and out of hours work during the reporting period. These were also published on the RMS project website and emailed to around 590 registered stakeholders (each time).

The community relations team has managed a number of community presentations, site tours and sponsorship applications for many community interest groups. Presentations were given to:

- Berry Forum
- Chamber of Commerce and the open business forum meeting
- The Arbour
- Berry Probus.

Fulton Hogan is also supporting indigenous employment opportunities on the project through the implementation of an Aboriginal Participation Plan.

Our communications approach focuses on keeping the community and stakeholders informed about the remaining traffic changes, landscaping and operations noise.

Contact with community members and stakeholders is recorded in the community contact database, which is Consultation Manager.

Event types	Events	Stakeholders distinct total	
Telephone call	5308	960	5522
Email	2469	1029	9512
Visit project office/display centre	2000	497	2023
Meeting	1069	365	1234
Letter	698	513	883
Text message	693	99	2660
Doorknock	281	218	354
EA submission	277	192	281
Invitation	126	106	127
Building Condition Inspection	122	106	121
Other	255	615	892
Total event search	**13298**	**2044**	**23609**

Table 5-3: Consultation Manager entries to date

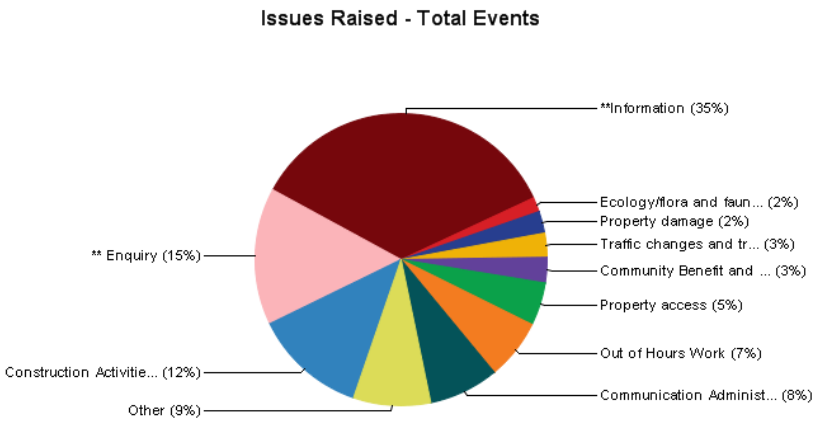

Table 5-4: Stakeholder events

5.3 Community Relations Survey

The next Community Relations Survey will occur in late 2017. This will be the final survey for the project.

6 Other compliance matters

6.1 Compliance Management

During the reporting period there were:

- One event recorded as an incident (see Table 6-1)
- No overpressure non-conformances
- No overall non-conformances for the project against the conditions of approval and statement of commitments.

Date	Description	Corrective actions	Status
22 August 2017	Grout slurry escaped into dry gully	Works ceased, grout removed and area remediated	Closed

Table 6-1: Incidents

6.2 Internal and external environmental inspections

The project completes many inspections to assess environmental performance and identify improvements.

Those inspections have resulted in environmental management improvements across the project. The improvements included new erosion and sediment control installations, improved site mitigations and general site improvements.

Table 6-2 summarises the inspections completed on the project. The inspections completed are consistent with the requirements of the project documents.

Inspection type	Attendees	Number of inspections
Weekly	Fulton Hogan staff; engineers, environmental, foreman, leading hands, labourers, superintendents, management	15
Wet weather	Fulton Hogan staff; engineers, environmental, foreman, leading hands, labourers, superintendents, management	7
Environmental Representative	Toby Hobbs Fulton Hogan staff; environmental staff, engineers, foreman and superintendents	9
Regional RMS	Michelle Toms RMS project staff Toby Hobbs Fulton Hogan staff; environmental staff, engineers, foreman and superintendents	7
NSW EPA	Michael Heinze, Julian Thompson **Fulton Hogan staff; environmental staff, engineers, foreman and superintendents**	2

Inspection type	Attendees	Number of inspections
NSW DPI (Fisheries)	Allan Lugg, Jillian Reynolds **Fulton Hogan staff; environmental staff, engineers, foreman and superintendents**	1
NSW DPI (Crown Land and Water)	David Zerafa Fulton Hogan staff; environmental staff, engineers, foreman and superintendents	2

Table 6-2: Inspections

One environmental review group (ERG) meeting was held during the reporting period. Table 6-3 lists attendees.

Meeting Type	Attendees	Date
Environmental Review Group	Ryan Whiddon (RMS) Graham Roche (RMS) David Ledlin (RMS) Michelle Toms (RMS) Jillian Reynolds (DPI: Crown Land and Water) David Zerafa (DPI: Crown Land and Water) Jacob Cooper (Fulton Hogan) Shannon Chisholm (Fulton Hogan) James Diamond (Fulton Hogan) Irina Kliger (Fulton Hogan) Rebekah Byrne (Fulton Hogan) Michael Young (DP&E) Amy Porter (DP&E) Toby Hobbs (Vantage Environmental Management) Tom Dimec (SCC) Kylie McClelland (OEH) Allan Lugg (DPI: Fisheries)	19 September 2017

Table 6-3: Environmental Review Group Meeting attendees

Appendix A Project Approval Compliance Table

Appendix B Surface Water Quality Monitoring Results

Appendix C Groundwater Quality Monitoring Results

Appendix D Air Quality Monitoring Results

FBB Compliance Tracking Table - 13th October 2016

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
PART A - ADMINISTRATIVE CONDITIONS						
Terms of Approval						
A1	The Proponent shall carry out the project generally in accordance with the: (a) Major Project Application MP10_0240; (b) Princes Highway upgrade – Foxground and Berry bypass - Environmental Assessment (Volumes 1-2), prepared by AECOM Australia Pty Ltd for Roads and Maritime Services and dated November 2012; (c) Princes Highway upgrade – Foxground and Berry bypass – Submissions Report, prepared by AECOM Australia Pty Ltd for Roads and Maritime Services and dated May 2013, including the revised Statement of Commitments contained therein; and (d) conditions of this approval.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), September 2017 Section 1.2 Tracked and reported bi-annually in the Compliance Tracking Reports.	Ongoing
A2	In the event of an inconsistency between: (a) the conditions of this approval and any document listed from condition A1(a) to A1(c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and (b) any document listed from condition A1(a) to A1(c) inclusive, and any other document listed from condition A1(a) to A1(c) inclusive, the most recent document shall prevail to the extent of the inconsistency.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2 Tracked and reported bi-annually in the Compliance Tracking Reports.	Ongoing
A3	The Proponent shall comply with any reasonable requirement(s) of the Secretary of the NSW Department of Planning & Environment (DP&E) arising from the Department's assessment of: (a) any reports, plans or correspondence that are submitted in accordance with this approval; and (b) the implementation of any actions or measures contained within these reports, plans or correspondence.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2 Tracked and reported bi-annually in the Compliance Tracking Reports.	Ongoing
A4	Subject to confidentiality, the Proponent shall make all documents required under this approval available for public inspection on request.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Community Consultation Strategy, January 2017	Ongoing
A5	The Proponent shall notify the Secretary of the NSW Department of Planning & Environment (DP&E) and other relevant government agencies of any incident with actual or potential significant off-site environmental impacts on people or the biophysical environment as soon as practicable and within 24 hours after the occurrence of the incident. The Proponent shall provide full written details of the incident to the Secretary of the NSW Department of Planning & Environment (DP&E) within seven days of the date on which the incident occurred. Note: Where an incident also requires reporting to the OEH and/or EPA the incident report prepared for the purposes of notifying the OEH and/or EPA would meet this requirement	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2	Ongoing
A6	The Proponent shall meet the requirements of the Secretary of the NSW Department of Planning & Environment (DP&E) or relevant government agency (as determined by the Secretary of the NSW Department of Planning & Environment (DP&E)) to address the cause or impact of any incident, as it relates to this approval, reported in accordance with condition A5, within such period as the Secretary of the NSW Department of Planning & Environment (DP&E) may require.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2	Ongoing
Limits of Approval						
A7	This approval shall lapse ten years after the date on which it is granted, unless construction works the subject of this project approval are physically commenced on or before that date.	Pre-construction, construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), Section 1.2	Ongoing
Statutory Requirements						
A8	The Proponent shall ensure that all necessary licences, permits and approvals required for the development of the project are obtained and maintained as required throughout the life of the project. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such necessary licences, permits or approvals except as provided under section 75U of the Act. This shall include relevant certification requirements in accordance with section 109R of the Act.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), Section 1.2	Ongoing
Staging						

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
A9	The Proponent may elect to construct and/ or operate the project in stages. Where staging is proposed, the Proponent shall submit a Staging Report to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of the first proposed stage. The Staging Report shall provide details of: (a) how the project would be staged including general details of work activities associated with each stage and the general timing of when each stage would commence; and (b) details of the relevant conditions of approval, which would apply to each stage and how these shall be complied with across and between the stages of the project. (c) Where staging of the project is proposed, these conditions of approval are only required to be complied with at the relevant time and to the extent that they are relevant to the specific stage(s). The Proponent shall ensure that an updated Staging Report (or advice that no changes to staging are proposed) is submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of each stage, identifying any changes to the proposed staging or applicable conditions. The Proponent shall ensure that all plans, sub-plans and other management documents required by the conditions of this approval and relevant to each stage (as identified in the Staging Report) are submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) no later than one month prior to the commencement of the relevant stages, unless an alternative timeframe is agreed to by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction, construction	RMS/Fulton Hogan	Compliant	NA. No changes to staging are proposed from that already approved by DP&E as part of the *Toolijooa Road Fill Works Stage of the Foxground and Berry bypass Project*.	Complete
PART B - PRIOR TO CONSTRUCTION						
Design						
B1	The proponent shall, in consultation with the relevant council/s, investigate the need for: (a) potential future on and off ramps at Woodhill Mountain Road; and (b) a potential future left turn lane onto the new highway from Toolijooa Road. The investigation shall be undertaken to the satisfaction of Secretary of the NSW Department of Planning & Environment (DP&E), and include consideration of the relevant environmental impacts (noise, flooding, heritage, biodiversity, traffic etc.) and consider any alternative options.	Pre-construction	RMS	Compliant	RMS consulted with both Kiama Municipal Council and Shoalhaven City Council regarding the future off ramps and left turn lane. A letter regarding B1 was sent to DP&E on 30th September 2014. DP&E advised of their satisfaction in addressing B1 in a letter dated 27th October 2014.	Complete
B2	The bridge piers at the Connollys Creek / Bundewallah Creek / Broughton Mill Creek crossing shall be located and designed in such a way to minimise visual impacts to Berry and the bridge piers at Broughton Creek crossing 3 are located and designed in such a way to minimise visual impacts to RMB 353 Princes Highway, Broughton Village. Evidence of how visual impacts have been minimised shall be provided to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of works that would influence the design of the bridge in this location.	Pre-construction	RMS/Fulton Hogan	Compliant	Compliance has been met through the development of the detailed Urban Design and Landscaping Plan 12 September 2014 Evidence of how visual impacts have been minimised was provided to DP&E on 30th September 2014.	Complete
Biodiversity - Mitigation Measures - Fauna and Waterways						
B3	The Proponent shall design (and implement) the fauna crossings identified in Table 5.1 of Volume 2 Appendix F of the document listed under condition A1(b), at the locations and in accordance with the minimum design principles identified in Table 5.1, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E)	Pre-construction	RMS/Fulton Hogan	Compliant	Princes Highway Foxground and Berry Bypass Fauna Crossings Report 20 November 2015 As at May 2017, installation of fauna crossings is nearing completion and installation is proceeding in general accordance with the Fauna Crossings Report and in consultation with OEH.	Ongoing
B4	Investigations into the design of fauna crossings identified in Table 5.1 of Appendix F of the document listed under condition A1(b) during detailed design shall be undertaken with the input of a suitably qualified and experienced ecologist and in consultation with OEH and DPI (Fishing and Aquaculture).	Pre-construction	RMS/Fulton Hogan	Compliant	Princes Highway Foxground and Berry Bypass Fauna Crossings Report 20 November 2015	Complete
B5	The Proponent shall prepare a report on the final design of fauna and/or waterway crossings identified in Table 5.1 of Appendix F of the document listed under condition A1(b), where the location of the crossing has changed and/or the crossing does not meet the minimum design principles identified in Table 5.1. The report shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E)prior to the commencement of construction of the relevant crossing, and shall demonstrate how the new location and/ or design would result in acceptable biodiversity outcomes. The report shall clearly identify how the fauna and/or waterway crossing will work in conjunction with complementary fauna exclusion fencing measures to be implemented for the project. The report shall be accompanied by evidence of consultation with OEH and DPI (Fishing and Aquaculture) in relation to the suitability of any changes to the location and/or crossing design.	Pre-construction	RMS/Fulton Hogan	Compliant	Princes Highway Foxground and Berry Bypass Fauna Crossings Report 20 November 2015	Complete
B6	The Proponent shall, in consultation with OEH and DPI (Fishing and Aquaculture), ensure that all waterway crossings are designed and constructed consistent with the principles of the Guidelines for Controlled Activities Watercourse Crossings (Department of Water and Energy, February 2008), Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries, February 2004) and Policy and Guidelines for Design and Construction of Bridges, Roads, Causeways, Culverts and Similar Structures (NSW Fisheries 1999). Where multiple cell culverts are proposed for creek crossings, at least one cell shall be provided for fish passage, with an invert or bed level that mimics creek flows.	Pre-construction	RMS/Fulton Hogan	Compliant	Flora and Fauna Management Sub Plan (Rev G) The project used three temporary bridges and one temporary culvert to provide access across the three 'Class 1' waterways on the project. All temporary creek crossings have now been removed and embankments have been rehabilitated.	Ongoing
Biodiversity Offsets						

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
B7	The Proponent shall, in consultation with the OEH and DPI (Fishing and Aquaculture), develop a **Biodiversity Offset Strategy** that identifies the available options for offsetting the biodiversity impacts of the project in perpetuity, with consideration to the Principles for the use of biodiversity offsets in NSW (OEH website http://www.environment.nsw.gov.au/biocertification/offsets.htm dated 17 June 2011). Unless otherwise agreed to by the OEH and DPI (Fishing and Aquaculture), offsets shall be provided on a like-for-like basis and at a minimum ratio of 4:1 for areas of high conservation value (including EEC, salt marsh, and poorly conserved vegetation communities identified as being more than 75% cleared in the catchment management area) and 2:1 for the remainder of native vegetation areas (including threatened species habitat, mangroves, seagrass, and non-EEC riparian vegetation). The Strategy shall include, but not necessarily be limited to: (a) the aims and objectives of the biodiversity offset strategy; (b) confirmation of the vegetation type/ habitat (in hectares) to be cleared and their condition, and the size of offsets required (in hectares); (c) details of the type of available offset measures that have been identified to compensate for the loss of threatened species and vulnerable and endangered ecological communities and/ or their habitats, and native vegetation (including mangroves, seagrasses, salt marsh and riparian vegetation). The measures shall achieve a neutral or net beneficial outcome for all the biodiversity values likely to be impacted directly or indirectly during both the construction and operation of the project; (d) the decision-making framework that would be used to select the final suite of offset measures to achieve the aims and objectives of the Strategy, including the ranking of offset measures; (e) a process for addressing and incorporating offset measures arising from changes in biodiversity impacts (where these changes are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition A1), including: (i) changes to the footprint due to detailed design; (ii) (changes to predicted impacts as a result of changes to mitigation measures; (iii) the identification of additional species/ habitat through pre-clearance surveys and construction; (iv) addressing outcomes of the ecological monitoring program; and (v) additional impacts associated with the establishment of ancillary facilities; and (f) options for the securing and management of biodiversity offsets in perpetuity. The Biodiversity Offset Strategy shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) for approval no later than 6 weeks prior to the commencement of construction that would result in the disturbance of native vegetation, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction	RMS	Compliant	Biodiversity Offset Strategy approved by DP&E 27 October 2014	Complete
B8	Within two years of the date of approval of the Biodiversity Offset Strategy, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall prepare and submit a **Biodiversity Offset Package** for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E). The Package shall be developed in consultation with the OEH and DPI (Fishing and Aquaculture), and shall include, but not necessarily be limited to: (a) details of the final suite of the biodiversity offset measures to be implemented for the project demonstrating how it achieves the requirements of the Biodiversity Offset Strategy (including specified offset ratios); (b) the final selected means of securing the biodiversity values of the Package in perpetuity, including ongoing management, maintenance and monitoring requirements; and (c) timing and responsibilities for the implementation of the provisions of the Package over time. The requirements of the Package shall be implemented by the responsible parties according to the timeframes set out in the Package, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Construction and operation	RMS	Compliant	The Biodiversity Offset Package was approved by DPE on the 3rd May 2017. A timeframe for implementation isn't identified in the BOP, however RMS are currently negotiating BioBanking agreements BioBanking agreements for two privately owned properties were lodged with OEH in the reporting period.	Ongoing
Ecological Monitoring						
B9	The Proponent shall develop an **Ecological Monitoring Program** to monitor the effectiveness of the biodiversity mitigation measures implemented as part of the project. The program shall be developed by a suitably qualified and experienced ecologist in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include but not necessarily be limited to: (a) an adaptive monitoring program to assess the effectiveness of the mitigation measures identified in conditions B3 and B36(b) and allow amendment to the measures if necessary. The monitoring program shall nominate performance parameters and criteria against which effectiveness will be measured and include operational road kill surveys to assess the effectiveness of fauna crossings and exclusion fencing implemented as part of the project; (b) mechanisms for developing additional monitoring protocols to assess the effectiveness of any additional mitigation measures implemented to address additional impacts in the case of design amendments or unexpected threatened species finds during construction (where these additional impacts are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition A1); (c) monitoring shall be undertaken during construction (for construction-related impacts) and from opening of the project to traffic (for operation/ ongoing impacts) until such time as the effectiveness of mitigation measures can be	Pre-construction	RMS/Fulton Hogan	Compliant	Ecological Monitoring Program approved 27 October 2014 Ecological monitoring is ongoing. Monitoring dates within the current reporting period were: - Aquatic monitoring: 29th May 2017 and 25th September 2017 - Nest box monitoring: 17th July 2017 - Weed monitoring: 25th September 2017	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	demonstrated to have been achieved over a minimum of three successive monitoring periods after opening of the project to traffic, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). The monitoring period may be reduced with the agreement of the Secretary of the NSW Department of Planning & Environment (DP&E) in consultation with the OEH and DPI (Fishing and Aquaculture), depending on the outcomes of the monitoring; (d) provision for the assessment of the data to identify changes to habitat usage and whether this can be directly attributed to the project; (e) details of contingency measures that would be implemented in the event of changes to habitat usage patterns directly attributable to the construction or operation of the project; and (f) provision for annual reporting of monitoring results to the Secretary of the NSW Department of Planning & Environment (DP&E) and the OEH and DPI (Fishing and Aquaculture), or as otherwise agreed by those agencies. The Program shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) for approval no later than 6 weeks prior to the commencement of construction that would result in the disturbance of native vegetation (unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E)).					
Hydrology and Flooding						
B10	The Proponent shall ensure, where feasible and reasonable, that the project is designed to not exceed the afflux and other flooding criteria within the vicinity of the project as identified or predicted in the documents listed under condition A1. New or duplicated drainage structures shall be designed to minimise changes to afflux and flooding to waterways that traverse the project alignment to the greatest extent practicable.	Pre-construction	RMS/Fulton Hogan	Compliant	Detailed Design - Flooding Report	Complete
B11	The Proponent shall develop a **Hydrological Mitigation Report** for properties in the Broughton Creek, Town Creek, Bundewallah Creek and Shoalhaven floodplain areas where flood impacts are predicted to increase as a result of the project. The Report shall be based on detailed floor level survey and associated assessment of potentially flood affected properties in those areas. The Report shall: (a) identify properties in those areas likely to have an increased flooding impact and detail the predicted increased flooding impact; (b) identify mitigation measures to be implemented where increased flooding is predicted to adversely affect access, property or infrastructure; (c) identify measures to be implemented to minimise scour and dissipate energy at locations where flood velocities are predicted to increase as a result of the project and cause localised soil erosion and/or pasture damage; (d) be developed in consultation with the relevant council, NSW State Emergency Service and directly-affected property owners; and (e) identify operational and maintenance responsibilities for items (a) to (c) inclusive. The Proponent shall not commence construction of the project on or within those areas likely to alter flood conditions until such time as works identified in the hydrological mitigation report have been completed, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction	RMS/Fulton Hogan	Compliant	Hydrological Mitigation Report Detailed Design - Flooding Report Updates have been provided to the Department regarding implementation of flood mitigation measures and this will continue to occur. Repeated attempts to gain agreement with the landowner have not been successful.	Ongoing
B12	Based on the mitigation measures identified in condition B11, the Proponent shall prepare a final schedule of feasible and reasonable flood mitigation measures proposed at each directly-affected property in consultation with the property owner. The schedule shall be provided to the relevant property owner(s) prior to the implementation/ construction of the mitigation works, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). A copy of each schedule of flood mitigation measures shall be provided to the Department and the relevant council prior to the implementation/ construction of the mitigation measures on the property.	Pre-construction	RMS/Fulton Hogan	Compliant	Hydrological Mitigation Report (by RMS)	Complete
B13	In the event that the Proponent and the relevant property owner cannot agree on feasible and reasonable flood mitigation measures to be applied to a property within one month of the first consultation on the measures (as required under condition B10), the Proponent shall employ a suitably qualified and experienced independent hydrological engineer, who has been approved by the Secretary of the NSW Department of Planning & Environment (DP&E), for the purposes of this condition prior to the commencement of construction in the Broughton Creek, Town Creek, Bundewallah Creek and Shoalhaven floodplain areas affected by increased afflux from the project to advise and assist affected property owners in negotiating feasible and reasonable mitigation measures.	Pre-construction	RMS	Compliant	Mark Babister from WMA Engineers appointed and approved by DP&E	Complete
B14	The Proponent shall provide assistance to the relevant council and/ or NSW State Emergency Service, to assist in the preparation of any new or necessary update(s) to the relevant plans and documents in relation to flooding, to reflect changes in flooding levels, flows and characteristics as a result of the project.	Pre-construction	RMS/Fulton Hogan	Compliant	RMS have consulted local council and they have advised that no assistance is required	Complete
Sedimentation, Erosion and Water						
B15	Prior to the commencement of construction, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall in consultation with the EPA and NOW, undertake **groundwater modelling** on the concept design for the project, subject to the modelling being revised should the detailed design have a significantly different impact on groundwater than the concept design. The modelling shall be undertaken by a suitably qualified and experienced groundwater expert and assess the construction and operational impacts of the proposal on the groundwater resources,	Pre-construction	RMS/Fulton Hogan	Compliant	Detailed Design - Geotechnical Design & Interpretative Report RMS undertook groundwater modelling on the RMS Concept Design for the project. Since the detailed design will not have a	Complete

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Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	groundwater quality, groundwater hydrology and groundwater dependent ecosystems and provide details of contingency and management measures in the groundwater management strategy required under condition B36(d).				significantly different impact on groundwater than the RMS Concept Design, no further groundwater modelling is required.	
B16	The Proponent shall prepare and implement a **Water Quality Monitoring Program** to monitor the impacts of the project on surface and groundwater quality and resources and wetlands, during construction and operation. The Program shall be developed in consultation with the OEH, EPA, DPI (Fishing and Aquaculture) and NOW and shall include but not necessarily be limited to: (a) identification of surface and groundwater quality monitoring locations (including watercourses, water bodies and SEPP14 wetlands) which are representative of the potential extent of impacts from the project; (b) the results of the groundwater modelling undertaken under condition B15; (c) identification of works and activities during construction and operation of the project, including emergencies and spill events, that have the potential to impact on surface water quality of potentially affected waterways; (d) development and presentation of parameters and standards against which any changes to water quality will be assessed, having regard to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (Australian and New Zealand Environment Conservation Council, 2000); (e) representative background monitoring of surface and groundwater quality parameters for a minimum of twelve months (considering seasonality) prior to the commencement of construction, to establish baseline water conditions, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E); (f) a minimum monitoring period of three years following the completion of construction or until the affected waterways and/ or groundwater resources are certified by an independent expert as being rehabilitated to an acceptable condition. The monitoring shall also confirm the establishment of operational water control measures (such as sedimentation basins and vegetation swales); (g) contingency and ameliorative measures in the event that adverse impacts to water quality are identified; and (h) reporting of the monitoring results to the Department, OEH, EPA and NOW. The Program shall be submitted to the Director-General for approval 6 months prior to the commencement of construction of the project, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). A copy of the Program shall be submitted to the OEH, EPA, DPI (Fishing and Aquaculture) and NOW prior to its implementation.	Pre-construction	RMS/Fulton Hogan	Compliant	Construction Soil and Water Quality Management Plan (Rev E) Appendix B - Water Quality Monitoring Program Surface water quality monitoring was undertaken on the following dates: - 8 June 2017 – Minor Event - 1 August 2017 – Minor Event Results are provided in Appendix B of this report. Ground water quality monitoring was undertaken on the following dates: - 27 June 2017 – Event 11 - 27 September 2017 – Event 12 Results are provided in Appendix C of this report. Previous groundwater monitoring results identified concentrations of zinc above reference criteria. During the reporting period, additional groundwater monitoring conducted at three additional up-gradient locations confirmed elevated zinc concentrations were representative of background groundwater quality rather than construction related impacts. The additional monitoring was conducted in accordance with a request for further information from DP&E	Ongoing
Heritage Impacts - Built and Landscape Heritage						
B17	Prior to pre-construction and construction impacts affecting 'Glen Devon' Federation Cottage (H11) and skid mounted work-site shed (H60), the Proponent shall carry out further historical research and investigate the options for relocation of these heritage items, in consultation with the department and the Heritage Council of NSW, to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E). Additionally, for H11, the proponent shall: (a) undertake archaeological investigations in accordance with condition B20; and (b) provide for the preparation and implementation of a heritage interpretation plan.	Prior to Pre-construction	RMS	Compliant	Glen Devon Cultural Heritage Assessment was submitted to DP&E on 16th July 2014 and was approved by DP&E in a letter dated 10th September 2014. DP&E was advised of the relocation outcome of Glen Devon in a letter dated 9th July 2015. The Glen Devon Heritage Interpretation Plan was submitted to DP&E on 9th July 2015.	Complete
B18	Prior to the commencement of preconstruction and construction works in proximity to the following items G2B H11, H13, H15, H16, H17, H19, H21, H22, H23, H30, H45, H47, H53, H54, H55, H56, H62, H63, and the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape (SICPH CL), and G2B A13, A14, A39, TRACL and MFT12 the Proponent shall complete all archival recordings, including photographic recording. In addition detailed historical research shall be undertaken for the following items G2B H60 H61, H63, the SICPH CL and G2B A39. This work shall be undertaken by an experienced heritage consultant, in accordance with the guidelines issued by the Heritage Council of NSW. The areas containing these items shall be clearly identified and/or fenced until the completion of the archival recordings. Within 6 months of completing the above work, the Proponent shall submit a report containing the archival recordings and the historical research, where required, to the Secretary of the NSW Department of Planning & Environment (DP&E), the Heritage Council of NSW, the local Council and the local Historical Society.	Prior to Pre-construction	RMS	Compliant	Archival recording and detailed historic research complete. Reports were sent to the DP&E independently of this Compliance Tracking Report. Reports relating to Non-Aboriginal heritage were submitted to DP&E on 10th July 2015 Reports relating to Aboriginal heritage were submitted to DP&E on 22nd October 2015 Reports were sent to the Heritage Council of NSW, the local Councils, and the local Historical Society during this reporting period.	Complete
B19	Prior to pre-construction and construction impacts affecting G2B H15, H19, H21, H22, H23, H30 and H55 the Proponent shall carry out further historical and physical archaeological investigations in relation to these road alignments , in consultation with the department and the Heritage Council of NSW, to the satisfaction of the Director-General. These investigations must: (a) undertake archaeological investigations in accordance with condition B22; (b) provide for the detailed analysis of any heritage items discovered during the investigations; (c) include management options for these heritage items (including options for relocation and display); and (d) if the findings of the investigations are significant, provide for the preparation and implementation of a heritage interpretation plan.	Prior to Pre-construction	RMS	Compliant	Historic and physical archaeological investigations complete. Report submitted to the DP&E on 10th July 2015.	Complete
Archaeology (Aboriginal and non-Aboriginal)						

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
B20	Prior to the commencement of pre-construction and construction activities affecting Aboriginal site G2B PAD 1 the Proponent shall: (a) undertake archaeological investigation of this site using a methodology generally consistent with testing undertaken for the Environmental Assessment, and prepared in consultation with the OEH (Aboriginal heritage) and the Aboriginal stakeholders; and (b) report on the results of the archaeological investigation, including recommendations (such as for further archaeological work), in consultation with the OEH and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E), and shall include, but not necessarily be limited to: (i) consideration of measures to avoid or minimise disturbance to Aboriginal objects where objects of moderate to high significance are found to be present; (ii) where impacts cannot be avoided, recommendations for any further investigations under condition B21; and (iii) management and mitigation measures to ensure there are no additional impacts due to pre-construction and construction activities.	Prior to Pre-construction	RMS	Compliant	Archaeological investigations complete. Report submitted to the DP&E on 22nd October 2015.	Complete
B21	Prior to the commencement of pre-construction and construction activities affecting sites G2B A16, A18, A24, A29, A30, A31, A32, A33, A36, and G2B PAD1 the proponent shall: (a) develop a detailed salvage strategy, prepared in consultation with the OEH (Aboriginal heritage) and the Aboriginal stakeholders. The investigation program shall be prepared to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E); and (b) undertake any further archaeological excavation works recommended by the results of the Aboriginal archaeological investigation program. Within twelve months of completing the above work, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall submit a report containing the findings of the excavations, including artefact analysis and Aboriginal Site Impacts Recording Forms (ASIR), and the identification of final storage location for all Aboriginal objects recovered (testing and salvage), prepared in consultation with the Aboriginal stakeholders, the OEH (Aboriginal heritage) and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E). Note: where archaeological testing has occurred as part of the Environmental Assessment and the results are included in the documents listed in condition A1(b) the sites tested must still form part of the final report prepared under condition B21(b).	Prior to Pre-construction	RMS	Compliant	Archaeological salvage works have been completed on behalf of RMS by the nominated project archaeologist Kelleher Nightingale Consulting, in accordance with the approved methodology. The salvage report was finalised and sent to DP&E during this reporting period	Complete
B22	Prior to the commencement of pre-construction and construction activities affecting non-Aboriginal sites H11, H14, H19, H23, H28, H30, H48, H49, H53, and H55, the Proponent shall: (a) Undertake an Historic archaeological investigation program in accordance with the Heritage Council's Archaeological Assessments Guideline (1996) using a methodology prepared, in consultation with the OEH (Heritage Branch), and to the satisfaction of the Director-General. This work should be undertaken by an archaeological heritage consultant approved by the Director-General. The nomination for the Excavation Director shall demonstrate ability to comply with the Heritage Council's Criteria for the Assessment of Excavation Directors (July 2011). (b) Report on the results of the non-Aboriginal archaeological investigation program, including recommendations (such as for further archaeological work), in consultation with the Heritage Branch, OEH and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E), and shall include, but not necessarily be limited to: (i) consideration of measures to avoid or minimise disturbance to archaeology, where archaeology of non-Aboriginal archaeological significance is found to be present; (ii) where impacts cannot be avoided, recommendations for any further investigations for archaeology of historical archaeological significance; and (iii) management and mitigation measures to ensure there are no additional impacts due to pre-construction and construction activities. (c) Undertake any further archaeological excavation works recommended by the results of the non-Aboriginal archaeological investigation program. Within 12 months of completing the above work, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall submit a report containing the findings of the excavations, including artefact analysis, and the identification of a final repository for finds, prepared in consultation with the OEH (Heritage branch) and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E). Note: where archaeological testing has occurred as part of the environmental assessment and the results are included in the documents listed in condition A1(b) the sites tested must still form part of the methodology and final report prepared for the non-Aboriginal archaeological investigation program.	Prior to Pre-construction	RMS	Compliant	Investigation and reporting is complete. Report submitted to the DP&E on 10th July 2015.	Complete
Urban Design and Landscaping						
B23	The Proponent shall prepare and implement an **Urban Design and Landscape Plan** for the project. The Plan shall be prepared in consultation with the relevant council and shall present an integrated urban design for the project. The Plan shall include, but not necessarily be limited to:	Pre-construction	RMS	Compliant	Urban Design and Landscape Plan approved by DP&E 27 October 2017. Works to rehabilitate the project footprint are ongoing and significant progressive stabilisation has been achieved throughout	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	(a) a principal goal of achieving the urban design objectives outlined in Section 2.2 Volume 2 Appendix I of the document referred to in Condition A1(b); (b) location of existing vegetation and proposed landscaping (including use of indigenous and endemic species where possible) and design features; (c) graphics such as sections, perspective views and sketches for key elements of the project (including, but not limited to built elements such as retaining walls, cuttings, embankments, bridges, and noise barriers); (d) a description of locations along the project corridor directly or indirectly impacted by the construction of the project (e.g. temporary ancillary facilities, access tracks, watercourse crossings, etc.) and details of the strategies to progressively rehabilitate regenerate and/ or revegetate the locations with the objective of promoting biodiversity outcomes and visual integration. Details of species to be replanted/ revegetated shall be provided, including their appropriateness to the area and considering existing vegetation and habitat for threatened species; (e) an assessment of the visual screening effects of existing vegetation and the proposed landscaping. Where residences and businesses have been identified as likely to experience high visual impact as a result of the project and high residual impacts are likely to remain, the Proponent shall in consultation with affected receptors, identify opportunities for providing at-receptor landscaping to further screen views of the project. Where agreed to with the landowner, these measures shall be implemented during the construction of the project; (f) take into account appropriate roadside plantings and landscaping in the vicinity of heritage items and ensure no additional heritage impacts; (g) specific details on the landscape treatments for the North Street corridor, Town Creek diversion and Town Park. (h) strategies for progressive landscaping of other environmental controls such as erosion and sedimentation controls, drainage and noise mitigation; (i) location and design treatments for any associated footpaths and cyclist elements, and other features such as seating, lighting (in accordance with AS 4282-1997 Control of the Obtrusive Effect of Outdoor Lighting), fencing, and signs; (j) evidence of consultation with the relevant council and community on the proposed urban design and landscape measures prior to its finalisation; and (k) monitoring and maintenance procedures for the vegetated built elements, rehabilitated vegetation and landscaping (including weed control) including performance indicators, responsibilities, timing and duration and contingencies where rehabilitation of vegetation and landscaping measures fail. The Plan shall be submitted for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of construction, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). The Plan may be submitted in stages to suit the staged construction program of the project.				the phases of construction. Decommissioning and rehabilitation of 2 ancillary sites was completed along with a further 5 sediment basins.	
Signage Policy						
B24	The Proponent shall prepare a **signage policy** which addresses the bypassed towns of Foxground and Berry, in consultation with the relevant council.	Operation	RMS/Fulton Hogan	Compliant	Foxground and Berry Bypass Signage Policy dated 20th September 2013	Complete
B25	The signage policy shall be consistent with the Guide: Signposting (RTA July 2007), Tourist Signposting guide (RMS and Destination NSW 2012) and provide information on the range of services available within Berry including advice on any parks that could be used as a rest area (and directional signage to these parks) and that that the route through the towns may be taken as an alternative to the highway.	Operation	RMS/Fulton Hogan	Compliant	Foxground and Berry Bypass Signage Policy dated 20th September 2013	Complete
Property and Landuse						
B26	The Proponent shall ensure that the project is designed to minimise land take impacts to surrounding properties (including agricultural properties) as far as feasible and reasonable, in consultation with the affected landowners. Where the viability of existing agricultural operations are identified to be impacted by the land requirements of the project, the Proponent shall as part of detailed design employ a suitably qualified and experienced independent agricultural specialist (that is approved by the Secretary of the NSW Department of Planning & Environment (DP&E) for the purpose of this condition), to assist in identifying alternative farming opportunities for the relevant properties.	Pre-construction	RMS	Compliant	During the project development no impacts were identified to the viability of existing agricultural operations. As such, engaging an independent agricultural specialist was not required.	Complete
B27	The proponent shall discuss Crown Land transfer options with DPI (Crown Lands) and Shoalhaven Council, for Crown land located along the length of the project between Tannery Road and the northern interchange, with a view to reaching a mutually acceptable outcome for all parties. Evidence of consultation shall be provided to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of construction, with an agreed outcome to be reached, and submitted to the Secretary of the NSW Department of Planning & Environment (DP&E), prior to the operation of the upgraded highway. In the event that a mutually acceptable agreement cannot be reached, the Secretary of the NSW Department of Planning & Environment (DP&E) must be advised in writing, to determine whether mediation may be required.	Pre-construction and construction		Compliant	Evidence of consultation was sent to DP&E on 26th September 2014. An outcome will be provided to DP&E prior to operation.	Ongoing
B28	The proponent shall, in consultation with Shoalhaven City Council, prepare a strategy for the use of the Council land adjacent the project at North Street (presently occupied by the Berry Riding Club) investigating options to minimise impacts on the riding club both during construction and operation of the project. The final option(s) shall be determined by the proponent prior to the	Pre-construction		Compliant	The strategy for the land between North Street and the Berry bypass has been progressed by Roads and Maritime and Shoalhaven City Council to the point where Council has exhibited a draft Berry District Park Masterplan. The Shoalhaven City Council sought community comment on the draft masterplan. Roads and	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	commencement of construction of works in the vicinity of the riding club, in consultation with Shoalhaven City Council and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E).				Maritime, in consultation with Shoalhaven City Council, has ensured that the Foxground and Berry Bypass Project has allowed sufficient land opportunity between North Street and the Berry Bypass to meet the needs identified in the masterplan. Roads and Maritime propose no further involvement in the masterplan development and a copy of the Council draft plan is available at the following link: http://shoalhaven.nsw.gov.au/My-Council/Current-Projects/Berry-District-Park RMS are awaiting confirmation from DPE that the requirements of Condition B28 have been met.	
Compliance Tracking						
B29	The Proponent shall develop and implement a **Compliance Tracking Program** to track compliance with the requirements of this approval. The Program shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) for approval prior to the commencement of construction and relate to both the construction and operational phases of the project, and include, but not necessarily be limited to: (a) provisions for the notification of the Secretary of the NSW Department of Planning & Environment (DP&E) of the commencement of works prior to the commencement of construction and prior to the commencement of operation of the project (including prior to each stage, where works are being staged); (b) provisions for periodic review of project compliance with the requirements of this approval and the documents listed under condition A1, including the Statement of Commitments; (c) provisions for periodic reporting of compliance status against the requirements of this approval and the documents listed under condition A1, including the Statement of Commitments, to the Secretary of the NSW Department of Planning & Environment (DP&E) including at least one month prior to the commencement of construction and operation of the project and at other intervals during the construction and operation, as identified in the Program; (d) a program for independent environmental auditing in accordance with ISO 19011:2003 - Guidelines for Quality and/ or Environmental Management Systems Auditing; (e) mechanisms for reporting and recording incidents and actions taken in response to those incidents; (f) provisions for reporting environmental incidents to the Secretary of the NSW Department of Planning & Environment (DP&E) during construction and operation; and (g) procedures for rectifying any non-compliance identified during environmental auditing, review of compliance or incident management.	Pre-construction, Construction, Operation	RMS/Fulton Hogan	Compliant	Compliance Tracking Program , Revision B 5 September 2014 Construction Environmental Management Plan (Rev G), Section 8.3 Notification prior to the commencement of operation has been sent to the Secretary along with this Compliance Status Report.	Ongoing
Community Information and Involvement - Provision of Electronic Information						
B30	Prior to the commencement of construction, the Proponent shall establish and maintain a new **website**, or dedicated pages within an existing website, for the provision of electronic information associated with the project. The Proponent shall, subject to confidentiality, publish and maintain up-to-date information on the website or dedicated pages including, but not necessarily limited to: (a) information on the current implementation status of the project; (b) a copy of the documents referred to under condition A1 of this approval, and any documentation supporting modifications to this approval that may be granted from time to time; (c) a copy of this approval and any future modification to this approval; (d) a copy of each relevant environmental approval, licence or permit required and obtained in relation to the project; (e) a copy of each current strategy, plan, program or other document required under this approval; and (f) the outcomes of compliance tracking in accordance with the requirements of condition B29.	Pre-construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy, (Rev 3) Section 7.2 Website:http://www.rms.nsw.gov.au/projects/south-coast/foxground-berry-bypass/index.html Periodic revisions and amendments of relevant documentation will be made as required.	Ongoing
Complaints and Enquiries Procedure						
B31	Prior to the commencement of construction, the Proponent shall ensure that the following are available for community complaints and enquiries during the construction period: (a) a telephone number on which complaints and enquiries about construction and operation activities may be registered; (b) a postal address to which written complaints and enquiries may be sent; and (c) an email address to which electronic complaints and enquiries may be transmitted. The telephone number, the postal address and the email address shall be published in a newspaper circulating in the local area prior to the commencement of construction and prior to the commencement of project operation. The above details shall also be provided on the website (or dedicated pages) required by this approval.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy, (Rev 3) sections 7.2 and 8.2	Ongoing
B32	The Proponent shall prepare and implement a **Construction Complaints Management System** consistent with AS 4269 Complaints Handling prior to the commencement of construction activities and must maintain the System for the duration of construction activities.	Pre-construction, Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy, (Rev 3) Sections 8.1 and 8.2	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	Information on all complaints received, including the means by which they were addressed and whether resolution was reached and whether mediation was required or used, shall be maintained by the Proponent and included in a complaints register. The information contained within the System shall be made available to the Secretary of the NSW Department of Planning & Environment (DP&E) on request.					
Community Involvement						
B33	The Proponent shall prepare and implement a **Community Communication Strategy** for the project. This Strategy shall be designed to provide mechanisms to facilitate communication between the Proponent, the Contractor, the Environmental Representative, the relevant council and the local community (broader and local stakeholders) on the construction and environmental management of the project. The Strategy shall include, but not necessarily be limited to: (a) identification of stakeholders to be consulted as part of the Strategy, including affected and adjoining landowners; (b) procedures and mechanisms for the regular distribution of information to stakeholders on the progress of the project and matters associated with environmental management; (c) procedures and mechanisms through which stakeholders can discuss or provide feedback to the Proponent and/ or Environmental Representative in relation to the environmental management and delivery of the project; (d) procedures and mechanisms through which the Proponent can respond to enquiries or feedback from stakeholders in relation to the environmental management and delivery of the project; and (e) procedures and mechanisms that would be implemented to resolve issues/ disputes that may arise between parties on the matters relating to environmental management and the delivery of the project. This may include the use of an appropriately qualified and experienced independent mediator. Key issues that should be addressed in the Community Communication Strategy should include (but not necessarily be limited to): (i) traffic management (including property access, pedestrian access); (ii) landscaping/urban design matters; (iii) construction activities; and (iv) noise and vibration mitigation and management. The Proponent shall maintain and implement the Strategy throughout construction of the project. The Strategy shall be approved by the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of construction, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction	RMS/Fulton Hogan	Compliant	a) Community Communication Strategy, 27 October 2015 Section 5.2 b) Community Communication Strategy, 27 October 2015 Section 7.2 and Appendix E c) Community Communication Strategy, 27 October 2015 Section 8.2 d) Community Communication Strategy, 27 October 2015 Section 8.2 e) Community Communication Strategy, 27 October 2015 Sections 4.1 and 8.2. Community Communication Strategy Appendix C i) Community Communication Strategy, 27 October 2015 Sections 4.1, 7.2 and 13. ii) Community Communication Strategy Sections 3.4, 7.2 and 7.5. iii) Community Communication Strategy Sections 3.4, 7.2 and 7.5. iv) Community Communication Strategy Sections 3.4, 7.2 and 7.5.	Ongoing
Environmental Management - Environmental Representative						
B34	Prior to the commencement of construction of the project, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall nominate for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E) a suitably qualified and experienced **Environment Representative**(s) that is independent of the design (including preparation of documentation referred to in condition A1), and construction personnel. The Proponent shall employ the Environmental Representative(s) for the duration of construction, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). The Environment Representative(s) shall: (a) be the principal point of advice in relation to the environmental performance of the project; (b) be consulted in responding to the community concerning the environmental performance of the project where the resolution of points of conflict between the Proponent and the community is required; (c) monitor the implementation of environmental management plans and monitoring programs required under this approval; (d) monitor the outcome of environmental management plans and advise the Proponent upon the achievement of project environmental outcomes; (e) have responsibility for considering and advising the Proponent on matters specified in the conditions of this approval, and other licences and approvals related to the environmental performance and impacts of the project; (f) ensure that environmental auditing is undertaken in accordance with the requirements of condition B29 and the project's Environmental Management System(s); (g) be given the authority to approve/ reject minor amendments to the Construction Environment Management Plan. What constitutes a "minor" amendment shall be clearly explained in the Construction Environment Management Plan required under condition B35; and (h) be given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.	Pre-construction, construction	RMS/Fulton Hogan	Compliant	Vantage Environmental (Toby Hobbs) has been appointed by RMS as the Environmental Representative on the Foxground and Berry Bypass.	Complete
Construction Environmental Management Plan						
B35	The Proponent shall prepare and (following approval) implement a **Construction Environmental Management Plan** for the project. The Plan shall outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in consultation with the relevant agencies and in accordance with the Guideline for the	Preconstruction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H) A periodic review was undertaken of the CEMP and sub plans in September 2017 and endorsed by the ER on 25th September 2017.	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
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	Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004). The Plan shall include, but not necessarily be limited to: (a) a description of activities to be undertaken during construction of the project or stages of construction, as relevant; (b) statutory and other obligations that the Proponent is required to fulfil during construction including approvals, consultations and agreements required from agencies and key legislation and policies. Evidence of consultation with relevant agencies shall be included identifying how issues raised by these agencies have been addressed in the Plan; (c) a description of the roles and responsibilities for relevant employees involved in the construction of the project including relevant training and induction provisions for ensuring that employees, including contractors and sub-contractors are aware of their environmental and compliance obligations under these conditions of approval; (d) identification of ancillary facility site locations, including an assessment against the location criteria outlined in condition C32; (e) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase and details of how environmental performance would be monitored and managed to meet acceptable outcomes including what actions will be taken to address identified potential adverse environmental impacts (including any impacts arising from the staging of the construction of the project and/ or concurrent construction works with adjacent Princes Highway Upgrade projects, as relevant). In particular, the following environmental performance issues shall be addressed in the Plan: (i) measures to monitor and manage dust emissions including dust from stockpiles, blasting, traffic on unsealed public roads and materials tracking from construction sites onto public roads; (ii) measures to minimise hydrology impacts, including measures to stabilise bed and bank structures as required, (iii) measures to monitor and manage impacts associated with the construction and operation of ancillary facilities, (iv) measures for the handling, treatment and management of contaminated materials, (v) measures to monitor and manage waste generated during construction including but not necessarily limited to: general procedures for waste classification, handling, reuse, and disposal; use of secondary waste material in construction wherever feasible and reasonable; procedures for dealing with green waste including timber and mulch from clearing activities; and measures for reducing demand on water resources (including the potential for reuse of treated water from sediment control basins); (vi) measures to monitor and manage spoil, fill and materials stockpile sites including details of how spoil, fill or material would be handled, stockpiled, reused and disposed and a stockpile management protocol detailing locational criteria that would guide the placement of stockpiles and management measures that would be implemented to avoid/ minimise amenity impacts to surrounding residents and environmental risks (including to surrounding water courses). Stockpile sites that affect heritage, threatened species, populations or endangered ecological communities require the approval of the Secretary of the NSW Department of Planning & Environment (DP&E), in consultation with the OEH; (vii) measures to monitor and manage hazard and risks including emergency management; and (viii) the issues identified in condition B36; (f) details of community involvement and complaints handling procedures during construction, consistent with the requirements of conditions B30 to B33; (g) details of compliance and incident management consistent with the requirements of condition B29; and (h) procedures for the periodic review and update of the Construction Environmental Management Plan and sub-plans required under condition B35 and B36 respectively, as necessary (including where minor changes can be approved by the Environmental Representative). The Plan shall be submitted for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E) no later than one month prior to the commencement of construction, or within such period otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). Construction works shall not commence until written approval has been received from the Secretary of the NSW Department of Planning & Environment (DP&E).					
B36	As part of the Construction Environment Management Plan for the project required under condition B35, the Proponent shall prepare and implement the following sub plan(s): (a) a **Construction Traffic Management Sub-plan**, prepared in accordance with the Roads and Maritime Service's QA Specification G10 – Control of Traffic and Traffic Control at Work Sites Manual (2003) to manage disruptions to traffic movements as a result of construction traffic associated with the project. The sub-plan shall be developed in consultation with the relevant council and shall include, but not necessarily be limited to: (i) identification of construction traffic routes and quantification of construction traffic volumes (including heavy vehicle/ spoil haulage) on these routes; (ii) details of vehicle movements for construction sites and site compounds including parking, dedicated vehicle turning areas, and ingress and egress points;	Preconstruction	RMS/Fulton Hogan	Compliant	(a) Construction Traffic Management Plan (Rev 3) and Appendices (b) Flora and Fauna Management Sub Plan (Rev G) and Appendices. (c) Noise and Vibration Management Sub Plan (Rev G) and Appendices (d) Soil and Water Quality Management Sub Plan (Rev F) and Appendices (e) Heritage Management Sub Plan (Rev F) and Appendices	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	(iii) details of potential impacts to traffic on the existing highway, the 'Sandtrack', and associated local roads, including, intersection level of service and potential disruptions to pedestrians, public transport, parking, cyclists and property access (iv) details of temporary and interim traffic arrangements to address potential impacts; (v) details of evidence based mitigation measures to address potential impacts on the 'Sandtrack'; (vi) a response procedure for dealing with traffic incidents; and (vii) mechanism for the monitoring, review and amendment of this sub-plan. (b) a **Construction Flora and Fauna Management Sub-plan** to detail how construction impacts on ecology will be minimised and managed. The sub-plan shall be developed in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include, but not necessarily be limited to: (i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the construction boundaries/ footprint of the project based on detailed design and to confirm the vegetation to be cleared as part of the project (including tree hollows, threatened flora and fauna species and riparian vegetation); (ii) updated sensitive area/ vegetation maps based on (i) above and previous survey work; (iii) details of general work practices and mitigation measures to be implemented during construction to minimise impacts on native fauna and native vegetation (particularly threatened species and EECs) not proposed to be cleared as part of the project, including, but not necessarily limited to: fencing of sensitive areas, a protocol for the removal and relocation of fauna during clearing, engagement of a suitably qualified and experienced ecologist to identify locations where they would be present and to oversee clearing activities and facilitate fauna rescues and re-location, clearing timing with consideration to breeding periods, measures for maintaining existing habitat features (such as bush rock and tree branches etc), seed harvesting and appropriate topsoil management, construction worker education, weed management (including controls to prevent the introduction or spread of Phytophthora cinnamomi), erosion and sediment control and progressive re-vegetation; (iv) specific procedures to deal with EEC/ threatened species anticipated to be encountered within the project corridor including re-location, translocation and/or management and protection measures; (v) a procedure for dealing with unexpected EEC/threatened species identified during construction including cessation of work and notification of the OEH, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures) and update of ecological monitoring and/ or biodiversity offset requirements consistent with conditions B7 and B8; and (vi) mechanism for the monitoring, review and amendment of this sub-plan; (c) a **Construction Noise and Vibration Management Sub-plan** to detail how construction noise and vibration impacts will be minimised and managed. The sub-plan shall be developed in consultation with the EPA and include, but not necessarily be limited to: (i) identification of nearest sensitive receptors and relevant construction noise and vibration goals applicable to the project; (ii) identification of key noise and/or vibration generating construction activities (based on representative construction scenarios, including at ancillary facilities) that have the potential to impact on surrounding sensitive receivers including expected noise/ vibration levels; (iii) identification of feasible and reasonable measures proposed to be implemented to minimise construction noise and vibration impacts (including construction traffic noise impacts); (iv) procedures for dealing with out-of-hour works in accordance with condition C4 and C6, including procedures for notifying the Secretary of the NSW Department of Planning & Environment (DP&E) concerning complaints received in relation to the extended hours approved under condition C4(e); (v) procedures and mitigation measures to ensure relevant vibration and blasting criteria are achieved, including a suitable blast program, applicable buffer distances for vibration intensive works, use of low-vibration generating equipment/ vibration dampeners or alternative construction methodology, and pre- and post-construction dilapidation surveys of sensitive structures where blasting and/ or vibration is likely to result in damage to buildings and structures (including surveys being undertaken immediately following a monitored exceedance of the criteria); (vi) procedures for notifying sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, as well as procedures for dealing with and responding to noise complaints; and (vii) a program for construction noise and vibration monitoring clearly indicating monitoring frequency, location, how the results of this monitoring would be recorded and, procedures to be followed where significant exceedances of relevant noise and vibration goals are detected;					

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
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	(d) a **Construction Soil and Water Quality Management Sub-plan** to manage surface and groundwater impacts during construction of the project. The sub-plan shall be developed in consultation with the OEH, EPA, DPI (Fishing and Aquaculture) and NOW and include, but not necessarily be limited to: (i) identification of potential sources of erosion and sedimentation, and water pollution (including those resulting from maintenance activities); (ii) details of how construction activities would be managed and mitigated to minimise erosion and sedimentation consistent with condition C20; (iii) where construction activities have the potential to impact on waterways or wetlands (through direct disturbance such as construction of waterway crossings or works in close proximity to waterways or wetlands), site specific mitigation measures to be implemented to minimise water quality, riparian and stream hydrology impacts as far as practicable, including measures to stabilise bed and/ or bank structures where feasible and reasonable, and to rehabilitate affected riparian vegetation to existing or better condition. The timing of rehabilitation of the waterways shall be identified in the sub-plan; (iv) a contingency plan, consistent with the Acid Sulphate Soils Manual, to deal with the unexpected discovery of actual or potential acid sulphate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage; (v) a tannin leachate management protocol to manage the stockpiling of mulch and use of cleared vegetation and mulch filters for erosion and sediment control; (vi) construction water quality monitoring requirements consistent with condition B16; and (vii) a groundwater management strategy, including (but not necessarily limited to): i. description and identification of groundwater resources (including depths of the water table and water quality) potentially affected by the project based on baseline groundwater monitoring undertaken in accordance with condition B15; ii. identification of surrounding licensed bores, dams or other water supplies and groundwater dependant ecosystems and potential groundwater risks associated with the construction of the project on these groundwater users and ecosystems; iii. measures to manage identified impacts on water table, flow regimes and quality and to groundwater users and ecosystems; iv. groundwater inflow control, handling, treatment and disposal methods; and v. a detailed monitoring plan to identify monitoring methods, locations, frequency, duration and analysis requirements; and (e) a **Construction Heritage Management Sub-plan** to detail how construction impacts on Aboriginal and non-Aboriginal heritage will be avoided, minimised and managed. The sub-plan shall be prepared by an appropriately qualified heritage consultant(s) and be developed in consultation with the Heritage Council of NSW, the OEH (Aboriginal heritage), and registered Aboriginal stakeholders (for Aboriginal heritage), and include, but not necessarily be limited to: (i) In relation to Aboriginal Heritage: i. details of management measures and strategies for protection, salvage, and/or conservation of sites and items that will be directly or indirectly impacted during construction (including further archaeological investigations, salvage measures and/ or measures to protect unaffected sites during construction works in the vicinity); ii. procedures for dealing with previously unidentified Aboriginal objects (excluding human remains) including cessation of works in the vicinity, assessment of the significance of the item(s) and determination of appropriate mitigation measures including when works can re-commence by a suitably qualified archaeologist in consultation with the department, OEH and registered Aboriginal stakeholders and assessment of the consistency of any new Aboriginal heritage impacts against the approved impacts of the project, and notification to the OEH, in accordance with section 89A of the National Parks and Wildlife Act 1974, and the department; iii. procedures for dealing with human remains, including cessation of works in the vicinity and notification of the department, NSW Police Force, OEH and registered Aboriginal stakeholders and not recommencing any works in the area unless authorised by the department and/ or the NSW Police Force); and iv. induction processes (identification, protection) for construction personnel (including procedures for keeping records of inductions) and procedures for ongoing Aboriginal consultation and involvement; and (ii) In relation to non-Aboriginal Heritage:					

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	i. details of management measures and strategies for protection, excavation, archival recording and/or conservation of heritage items that will be directly or indirectly impacted during construction (including measures to protect unaffected items during construction works in the vicinity); ii. procedures for dealing with previously unidentified items of heritage significance, including cessation of works in the vicinity, assessment of the significance of the item(s) and determination of appropriate mitigation measures including when works can re-commence by a suitably qualified and experienced archaeologist in consultation with the department and the Heritage Council of NSW and assessment of the consistency of any new non-Aboriginal heritage impacts against the approved impacts of the project and notification of the Heritage Council of NSW, in accordance with Section 146 of the NSW Heritage Act 1977, and the department; iii. procedures for dealing with human remains, including cessation of works in the vicinity and notification of the department, NSW Police Force, the Heritage Council of NSW and not recommencing any works in the area unless authorised by the department, and/ or the NSW Police Force); and iv. heritage induction processes (identification, protection) for construction personnel (including procedures for keeping records of inductions).					
PART C - DURING CONSTRUCTION						
Biodiversity						
C1	The Proponent shall employ feasible and reasonable measures to minimise the clearing of native vegetation during the construction of the project.	Construction	Fulton Hogan	Compliant	Flora and Fauna Management Sub Plan (Rev G) and Appendices: contains provisions for minimising clearing.	Ongoing
Air Quality Impacts						
C2	The Proponent shall employ feasible and reasonable measures (including cessation of relevant works, as appropriate) to ensure that the project is constructed in a manner that minimises dust generation, including wind-blown dust, traffic-generated dust, dust from stockpiles and material tracking from construction and ancillary facility sites onto public roads.	Construction	Fulton Hogan	Compliant	Air Quality Management Sub Plan (Rev G), September 2017	Ongoing
Noise and Vibration Impacts - Construction Hours						
C3	The Proponent shall only undertake construction activities associated with the project during the following standard construction hours: (a) For the area south of Tindalls Lane (including Berry township) (i) 7:00am to 6:00pm Mondays to Fridays, inclusive; and (ii) 8:00am to 1:00pm Saturdays; and (iii) at no time on Sundays or public holidays.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev G), September 2017	Ongoing
C4	Works outside of the standard construction hours identified in condition C3 may be undertaken in the following circumstances: (a) works that generate noise that is: (i) LAeq (15 minute) noise levels no more than 5dB(A) above rating background level at any residence in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009): and (ii) LAeq (15 minute) noise levels no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) at other sensitive receivers; or (b) where a negotiated agreement has been reached with affected receivers, where the prescribed noise levels cannot be achieved; or (c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or (d) for the area between Toolijooa Road and Tindalls Lane, encompassing Toolijooa cut, Broughton Creek floodplain and major bridge works (outside of Berry township) low noise impact activities and works as follows: (i) between 6:00am and 7:00am Monday to Friday; and (ii) between 6:00pm and 7:00pm Monday to Friday; and (iii) 1:00pm and 5:00pm on Saturdays; and (iv) at no time after 6pm on a day preceding a public holiday long weekend; and (e) where it is required in an emergency to avoid injury or the loss of life, property and/or to prevent environmental harm; or (f) works approved through an EPL, including for works identified in an out of hours procedure.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev G) Appendix E Additional approved out of hour's works have been completed and are compliant to the requirements of the individual supplementary approval. Condition C4 was modified by DP&E 31 July 2015 to allow for the NSW EPA to consider and approve Out of Hours Work (OOHW) in accordance with the Project Environmental Protection Licence (EPL)	Ongoing
C5	Except as expressly permitted by an Environment Protection Licence issued for the project, high noise impact activities and works shall only be undertaken: (a) between the hours of 8:00am to 6:00pm Mondays to Fridays; (b) between the hours of 8:00am to 1:00pm Saturdays; and (c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev G), September 2017, Chapter 7	Ongoing

<table>
<tr><th colspan="6">MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979</th></tr>
<tr><th>Ref</th><th>Condition Requirement</th><th>Phase</th><th>Responsibility</th><th>Compliance status</th><th>Compliance notes</th><th>Close out</th></tr>
<tr><td></td><td>For the purposes of this condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>C6</td><td>~~Construction activities (Out of Hours work) may be allowed to occur outside the construction hours specified in condition C3 with the prior written approval of the Secretary of the NSW Department of Planning & Environment (DP&E). Requests for Out of Hours approval will be considered for construction activities which cannot be undertaken during the construction hours specified in condition C3 for technical or other justifiable reasons and will be considered on a case by case or activity-specific basis. Request for Out of Hours work must be accompanied by:~~
~~(a) details of the nature and need for activities to be conducted during the varied construction hours;~~
~~(b) written evidence to the EPA and the Secretary of the NSW Department of Planning & Environment (DP&E) that activities undertaken during the varied construction hours are justified, appropriate consultation with potentially affected receivers and notification of the relevant Council has been undertaken, issues raised have been addressed, and all feasible and reasonable mitigation measures have been put in place; and~~
~~(c) evidence of consultation with the EPA on the proposed variation in standard construction hours.~~
~~Despite the above, Out of Hours work may also occur in accordance with an approved Construction Environment Management Plan or Construction Noise and Vibration Management Sub-plan for this project, where that plan provides a process for considering the above on a case by case or activity specific basis by the Proponent, including factors (a) to (c) above.~~</td><td>Construction</td><td>Fulton Hogan</td><td>N/A</td><td>Condition C6 deleted by DP&E in accordance with the Modification of 31 July 2015</td><td>N/A</td></tr>
<tr><td>C7</td><td>Blasting associated with the project shall only be undertaken during the following hours:
(a) 9:00am to 5:00pm, Mondays to Fridays, inclusive;
(b) 9:00am to 1:00pm on Saturdays; and
(c) at no time on Sundays or public holidays.
This condition does not apply in the event of a direction from the NSW Police Force or other relevant authority for safety or emergency reasons to avoid loss of life, property loss and/or to prevent environmental harm.</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G), September 2017, Appendix D.
Blasting was completed in July 2016. No further blasting is proposed.</td><td>Complete</td></tr>
<tr><td colspan="7">Construction Noise and Vibration Goals</td></tr>
<tr><td>C8</td><td>The Proponent shall implement feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) during construction activities. Any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the Construction Noise and Vibration Management Sub-plan required under condition B36.</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.1 and Chapter 7
No exceedances were observed in the reporting period. Noise is reported monthly in EPL reports and publically available on the Fulton Hogan website.
(http://www.fultonhogan.com/news-resources/management-plans-reporting/foxground-berry-bypass-nsw/)</td><td>Ongoing</td></tr>
<tr><td>C9</td><td>The Proponent shall implement all feasible and reasonable mitigation measures with the aim of achieving the following construction vibration goals:
(a) for structural damage to heritage structures, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures;
(b) for damage to other buildings and/or structures, the vibration limits set out in the British Standard BS 7385-1:1990 – Evaluation and measurement for vibration in buildings. Guide for measurement of vibration and evaluation of their effects on buildings; and
(c) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006).</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G), September 2017, Section 4.2 and Chapter 7</td><td>Ongoing</td></tr>
<tr><td>C10</td><td>The Proponent shall ensure that airblast overpressure generated by blasting associated with the project does not exceed the criteria specified in Table 1 when measured at the most affected residence or other sensitive receiver.
Table 1 - Airblast overpressure criteria:
<table><tr><th>Airblast overpressure (dB(Lin Peak))</th><th>Allowable exceedance</th></tr><tr><td>125</td><td>5% of total number of blasts over a 12 month period</td></tr><tr><td>135</td><td>0%</td></tr></table></td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.2, Chapter 7 and Appendix D
Blasting is complete.</td><td>Complete</td></tr>
<tr><td>C11</td><td>The Proponent shall ensure that ground vibration generated by blasting associated with the project does not exceed the criteria specified in Table 2 when measured at the most affected residence or other sensitive receiver.
Table 2 – Peak particle velocity criteria</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.3, Chapter 7 and Appendix D
Blasting was completed in this reporting period and no further blasting is required</td><td>Complete</td></tr>
</table>

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	<table><tr><th>Receiver</th><th>Peak particle velocity (mm/s)</th><th>Allowable exceedance</th></tr><tr><td rowspan="2">Residence on privately owned land</td><td>**5**</td><td>5% of total number of blasts over a 12 month period</td></tr><tr><td>**10**</td><td>0%</td></tr><tr><td>Non-Aboriginal Heritage Item</td><td>**3**</td><td>0%</td></tr></table>					
C12	To ensure that the criteria specified in conditions C10 and C11 are satisfied at the most affected residence or other sensitive receiver, blasting trials shall be undertaken prior to the commencement of the project's blasting program, with results from the trial blasts used to determine site specific blast design to satisfy the relevant criteria.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev G) Section 4.3, Chapter 7 and Appendix D Blasting was completed in this reporting period and no further blasting is required	Complete
C13	C13. The blasting criteria identified in conditions C10 and/or C11 may be exceeded where the Proponent has written approval from the Director General. In obtaining the Director General's approval for any such exceedance the Proponent shall submit to the Director General: (a) a written agreement from the EPA and the relevant landowner to exceed the criteria; (b) details of the proposed blasting program and justification for the proposed increase to blasting criteria including alternatives considered (where relevant); (c) an assessment of the environmental impacts of the increased blast limits on the surrounding environment and most affected residences or other sensitive receivers including, but not limited to noise, vibration and air quality and any risk to surrounding utilities, services or other structures; (d) in relation to any identified non-Aboriginal heritage items in the vicinity of blasting works, an assessment of heritage impacts; (e) details of the blast management, mitigation and monitoring procedures to be implemented; (f) details of consultation undertaken (including clear identification of proposed blast limits and potential property impacts) and agreement reached with the relevant landowners and EPA (including a copy of the agreement in relation to increased blasting limits). Unless otherwise agreed by the Director General, the following exclusions apply to the application of this condition: (a) any agreements reached may be terminated by the landowner at any time should concerns about the increased blasting limits be unresolved; and (b) the blasting limit agreed to under any agreement can at no time exceed a maximum Peak Particle Velocity vibration level of 25 mm/s or maximum Airblast Overpressure level of 125 dBL.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev G) Section 4.3, Chapter 7 and Appendix D Modification to C13 was approved on 28th January 2015 Blasting was completed in this reporting period and no further blasting is required	Complete
Operational Noise Mitigation Review						
C14	Unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), within 6 months of commencing construction, the Proponent shall, in consultation with the EPA, prepare and submit for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E), a review of the operational noise mitigation measures proposed to be implemented for the project. The review shall: (a) confirm the operational noise predictions of the project based on detailed design. This operational noise assessment shall be based on an appropriately calibrated noise model (which has incorporated additional noise monitoring, where necessary for calibration purposes); (b) review the suitability of the operational noise mitigation measures identified in the documents listed under condition A1 to achieve the criteria outlined in the *Road Noise Policy* (DECCW, 2011), based on the operational noise performance of the project predicted under (a) above; and (c) where necessary, investigate additional feasible and reasonable noise mitigation measures to achieve the criteria outlined in the Road Noise Policy (DECCW, 2011).	Construction	RMS/Fulton Hogan	Compliant	Operational Noise Management Design Report Rev 3 dated 16 March 2015. Approved by DP&E on 12th June 2015	Complete
Heritage Impacts						

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
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C15	This approval does not allow the Proponent to destroy, modify or otherwise physically affect human remains as part of the project.	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev F), September 2017, Chapter 5 and Appendix A Modification of C15 was approved on 29th September 2017	Ongoing
C16	The Proponent shall not destroy, modify or otherwise physically affect Aboriginal sites A3, A20, A37 – A39, and MFT 13-23 and non-Aboriginal sites H25, H26, H51, H52, H58, and H59.	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev F), September 2017, Chapter 5 Modification of C16 was approved on 29th September 2017	Ongoing
C17	Identified impacts to heritage (both Aboriginal and non-Aboriginal), shall be minimised to the greatest extent practicable through both detailed design and construction, particularly with regard to Aboriginal sites A13, A14, A18 and TRACL, and historic sites H13, H20, H54, H62, H63 and the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape. Where impacts are unavoidable, works shall be undertaken in accordance with the actions to manage heritage construction impacts required by condition B36(e) and under the guidance of an appropriately qualified heritage specialist.	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev F), September 2017, Chapter 5 Detailed design of the Foxground and Berry Bypass Urban Design and Landscaping Plan 20 November 2015	Ongoing
C18	The proponent shall not destroy, modify or otherwise physically affect any heritage items outside the approved project footprint, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E) in accordance with Condition C32 of this project approval.	Construction	RMS/Fulton Hogan	Compliant	CEMP Section 3.7 and Appendix A5 Heritage Management Sub Plan (Rev F), September 2017, Chapter 5	Ongoing
C19	The measures to protect Aboriginal or historic heritage sites near or adjacent to the project during construction shall be detailed in the Heritage Management Sub-plan required under condition B36(e).	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev F), September 2017, Chapter 5	Ongoing
Sedimentation, Erosion and Water						
C20	Soil and water management measures consistent with *Managing Urban Stormwater - Soils and Construction Volumes 1 and 2, 4th Edition* (Landcom, 2004) and *Managing Urban Stormwater Soils And Construction Vols 2A and 2D Main Road Construction* (Department of Environment and Climate Change, 2008) shall be employed during the construction of the project for erosion and sediment control.	Construction	RMS/Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev F), September 2017, Section 2.2 and Chapter 5	Ongoing
C21	Where available, and of appropriate chemical and biological quality, the Proponent shall use stormwater, recycled water or other water sources in preference to potable water for construction activities, including concrete mixing and dust control.	Construction	RMS/Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev F), September 2017, Chapter 5	Ongoing
C22	All surface water and groundwater must be adequately treated prior to entering the stormwater system to protect the receiving water source quality.	Construction	RMS/Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev F), September 2017, Chapter 5	Ongoing
Property and Landuse						
C23	The Proponent shall construct the project in a manner that minimises impacts to private properties and other public or private structures (such as dams, fences, utilities, services etc.) along the project corridor. In the event that construction of the project results in direct or indirect damage to such property or structure, the Proponent shall arrange and fund repair of the damage to a standard comparable to that in existence prior to the damage occurring, unless otherwise agreed by the relevant property or utility owner.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Appendices C and E. Noise and Vibration Management Sub Plan (Rev G), September 2017, Chapter 7 Dilapidation Reports have been completed	Ongoing
C24	Access to private property shall be maintained during construction unless otherwise agreed with the property owner in advance. A landowner's access that is physically affected by the Project shall be reinstated to meet at least equivalent standard and/or relevant road safety standards, in consultation with the property owner.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Sections 3.4 and 7.2	Ongoing
C25	Any damage caused to property as a result of the project shall be rectified or the property owner compensated, within a reasonable timeframe, with the costs borne by the Proponent. This condition is not intended to limit any claims that the property owner may have against the Proponent.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Section 7.2	Ongoing
C26	The Proponent shall, in consultation with relevant property owners, construct the project in a manner that minimises intrusion and disruption to agricultural operations/ activities in surrounding properties (e.g. stock access, access to farm dams etc.), unless otherwise agreed by the relevant property owner.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Section 7.2	Ongoing
Traffic Impacts						
C27	The roads likely to be used by the project's heavy construction vehicles shall be identified in the Construction Traffic Management Sub-plan required under condition B36(a). (a) Road dilapidation reports shall be prepared for local roads likely to be used by the project's construction traffic, and a copy of the report(s) shall be provided to the relevant council, prior to use by the project's heavy construction vehicles. Any damage resulting from the use of the identified local roads by the project's heavy construction vehicles, aside from that resulting from normal wear and tear, shall be repaired at the cost of the Proponent, unless otherwise agreed by the relevant council. (b) A road dilapidation report shall be prepared for the 'Sandtrack' and a copy of the report shall be provided to the relevant council, prior to commencement of construction. Should monitoring in accordance with Condition B36(a)	Pre-construction	RMS/Fulton Hogan	Compliant	Construction Traffic Management Plan (Rev 3) Section 2 A road dilapidation report for the 'Sandtrack' will be submitted to DPE prior to operation.	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
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	reveal higher than anticipated volumes of traffic (as defined in the document referred to in Condition A1(b)) resulting in a higher rate of deterioration in the condition of local road infrastructure, consultation with the relevant Council shall be undertaken to determine mitigation measures in accordance with condition B36(a). A report shall be prepared and submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) at 12 months and 24 months after commencement of construction, and prior to operation, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).					
Waste Management						
C28	The Proponent shall not cause, permit or allow waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste.	Construction	RMS/Fulton Hogan	Compliant	Waste and Energy Management Sub Plan (Rev H), Chapters 4 and 5	Ongoing
C29	The Proponent shall maximise the reuse and/or recycling of waste materials generated on site as far as practicable, to minimise the need for treatment or disposal of those materials off site.	Construction	RMS/Fulton Hogan	Compliant	Waste and Energy Management Sub Plan (Rev H), Chapters 4 and 5	Ongoing
C30	The Proponent shall ensure that liquid and/or non-liquid waste generated on the site is assessed and classified in accordance with Waste Classification Guidelines (Department of Environment and Climate Change, 2008) and where removed from the site is directed to a waste management facility lawfully permitted to accept the materials.	Construction	RMS/Fulton Hogan	Compliant	Waste and Energy Management Sub Plan (Rev H), Chapters 4 and 5	Ongoing
Hazards and Risks						
C31	The Proponent shall store and handle dangerous goods, as defined by the Australian Dangerous Goods Code, strictly in accordance with: (a) relevant Australian Standards; (b) for liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund; and (c) the Environment Protection Manual for Authorised Officers: Bunding and Spill Management, Technical Bulletin (Environment Protection Authority, 1997). In the event of an inconsistency between the requirements listed from (a) to (c) above, the most stringent requirement shall prevail to the extent of the inconsistency.	Pre-construction, Construction	RMS/Fulton Hogan	Compliant	Project Work Health and Safety Management Plan Section 8.4 Soil and Water Quality Management Sub Plan (Rev F), September 2017, Section 5.11	Ongoing
Ancillary Facilities						
C32	Unless otherwise approved by the Secretary of the NSW Department of Planning & Environment (DP&E) in accordance with this condition, the sites for ancillary facilities (except stockpiles) associated with the construction of the project shall: (a) be located more than 50 metres from a waterway; (b) have ready access to the road network or direct access to the construction corridor; (c) not require native vegetation clearing beyond that already required by the project; (d) be sited on relatively level land; (e) be separated from the nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant); (f) not unreasonably affect the land use of adjacent properties; (g) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented; (h) provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours; and (i) not impact on heritage items beyond those already impacted by project (including identified Aboriginal cultural value and archaeological sensitivity).	Pre-construction and Construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5 As the project risk footprint is reduced, the project team continue to rehabilitate areas formerly used as ancillary facilities	Ongoing
C33	Ancillary sites that do not meet the criteria set out under condition C32 of this approval shall be approved by the Secretary of the NSW Department of Planning & Environment (DP&E) prior to establishment. In obtaining this approval, the Proponent shall assess the ancillary facility against the criteria set out under condition C32 of this approval to demonstrate how the potential environmental impacts can be mitigated and managed to acceptable standards. Such assessment(s) can be submitted separately or as part of the Construction Environmental Management Plan required under B35 of this approval. The assessment shall include, but not necessarily be limited to: (a) a description of the ancillary facility, its components and the surrounding environment; (b) details on the activities to be carried out at the facility, including the hours of use and the storage of dangerous and hazardous goods; (c) an assessment of the environmental impacts on the site and the surrounding environment, including, but not limited to noise, vibration, air quality, traffic access, flora and fauna, heritage and light spill; (d) details on the mitigation, monitoring and management procedures specific to the ancillary facility that would be implemented to minimise the environmental impacts or, where this is not possible, feasible and reasonable measures to offset these impacts and an assessment of the adequacy of the mitigation or offsetting measures. This shall include consideration of restrictions on the hours of use or exclusion of certain activities;	Pre-construction and Construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5 Operation and construction of sites D and H was approved 15 January 2015 subject to the implementation of Ancillary facilities assessment for proposed ancillary facilities at Broughton Creek (Site D) and Austral Park Road (Site H): Foxground and Berry Bypass, November 2014.	Ongoing

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	**Condition Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	(e) details on the timing for the completion of activities at the ancillary facility and how the site will be decommissioned (including any necessary rehabilitation); and (f) demonstrated overall consistency with the approved project. The Proponent shall demonstrate to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E) that there will be no significant adverse impact from that facility's construction or operation.					
C34	The Secretary of the NSW Department of Planning & Environment (DP&E)'s approval is not required for minor ancillary facilities (e.g. lunch sheds, office sheds, and portable toilet facilities, etc.) that do not comply with the criteria set out in condition C32 of this approval and which: (a) are located within an active construction zone within the approved project footprint; and (b) have been assessed by the Environmental Representative to have: (i) minimal amenity impacts to surrounding residences, with consideration to matters such as noise and vibration impacts, traffic and access impacts, dust and odour impacts, and visual (including light spill) impacts, and (ii) (minimal environmental impact in respect to waste management, and no impacts on flora and fauna, soil and water, and heritage beyond those approved for the project; and (c) have environmental and amenity impacts that can be managed through the implementation of environmental measures detailed in a Construction Environment Management Plan for the project.	Construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5	Ongoing
PART D - PRIOR TO OPERATIONS						
Operational Environmental Management System						
D1	Prior to the commencement of operation, the Proponent shall incorporate the project into its existing environmental management systems.	Construction	RMS/Fulton Hogan	Compliant	Will be completed prior to operation as required.	Ongoing
PART E - DURING OPERATIONS						
Operational Noise						
E1	Within 12 months of the commencement of operation of the project, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall undertake operational noise monitoring to compare actual noise performance of the project against noise performance predicted in the review of noise mitigation measures required by condition C14, and prepare an **Operational Noise Report** to document this monitoring The Report shall include, but not necessarily be limited to: (a) noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under condition C14 and documents specified under condition A1 of this approval; (b) a review of the operational noise levels in terms of criteria and noise goals established in the Environmental Criteria for Road Traffic Noise (EPA, 1999); (c) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which project noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers; (d) details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared; (e) any required recalibrations of the noise model taking into consideration factors such as actual traffic numbers and proportions; (f) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of all feasible and reasonable mitigation measures; and (g) identification of additional feasible and reasonable measures to those identified in the review of noise mitigation measures required by condition C14, that would be implemented with the objective of meeting the criteria outlined in the Environmental Criteria for Road Traffic Noise (EPA, 1999), when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary of the NSW Department of Planning & Environment (DP&E) and the EPA. The Proponent shall provide the Secretary of the NSW Department of Planning & Environment (DP&E) and the EPA with a copy of the Operational Noise Report within 60 days of completing the operational noise monitoring referred to in (a) above or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Operation	RMS/Fulton Hogan	NA at this stage – relates to operation.	Relates to operation	Ongoing

Table 1: Revised statement of commitments (May 2013)

SoC – Revised statement of commitments (May 2013)						
No.	**Commitment Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
Environmental management						
EM1	The head contractor for the project will have an Environmental Management System (EMS).	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H) and Sub-plans	Ongoing
EM2	Environmental management plans will be developed and implemented by suitably qualified and experienced personnel and will incorporate as a minimum the mitigation and management measures in the environmental assessment.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H) and Sub-plans	Ongoing
EM3	Environmentally sensitive areas (such as native vegetation, river flat eucalypt forest and cultural heritage) within the construction site boundary will be marked on sensitive area maps, demarcated and signposted where necessary. Maps will be made available during all on-site inductions to construction personnel.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Appendix A6	Ongoing
EM4	All construction personnel will receive training regarding environmental management.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Chapter 5	Ongoing
Community consultation						
CC1	The community will be kept informed with measures such as: - Letter box drops, media releases and community updates. - An internet site established and maintained for the duration of the project. - Variable message signs. - The project office. - Email to registered stakeholders. - Targeted consultation with affected individuals or groups. Information to be provided will include: - Changes to access and traffic conditions. - A detail of future works programs. - General construction progress.	Pre-construction and construction	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Ongoing
CC2	Communication management will include: - A 24 hour toll-free contact telephone number. - Directions on how to register a complaint or make an inquiry. - Acknowledgement of complaints within 24 hours. - A complaint recording and tracking system.	Pre-construction and construction	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Sections 8.1 and 8.2	Ongoing
Traffic and transport						
TT1	Construction vehicle movements and works programs will incorporate traffic control measures to minimise traffic and transport impacts on local roads and the existing highway.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Traffic Management Plan (Rev3), Chapter 3	Ongoing
TT2	Road safety on 'the Sandtrack' will be monitored during construction. Should additional road safety issues be identified appropriate road safety measures will be implemented where reasonable and feasible, in consultation with Kiama Municipal Council and Shoalhaven City Council.	Construction	RMS	Compliant	Construction Traffic Management Plan (Rev3), Chapter 2	Ongoing
TT3	Traffic levels and operational performance will be monitored during peak periods, at approximately 6 and 12 months following completion of the project.	Operation	RMS	NA at this stage – relates to operation.	Relates to operation	Ongoing
Noise and vibration						
NV1	Mitigation and management measures, such as noise barriers, pre-dilapidation surveys and monitoring, will be used to minimise construction noise and vibration at sensitive receivers.	Construction	Fulton Hogan	Compliant	Construction Noise and Vibration Management Sub-plan (Rev G), Chapter 7 and Section 8.3	Ongoing
NV2	If required due to ground conditions, impact piling ('driven piles') will be conducted during standard working hours.	Construction	Fulton Hogan	Compliant	There are no driven piles on the project.	Complete
NV3	Reasonable and feasible mitigation measures, such as noise barriers in the vicinity of North Street and Huntingdale Park Road and architectural treatments, will be developed and implemented to meet the noise criteria applicable to the project in consultation with the sensitive receiver.	Pre-construction	Fulton Hogan	Compliant	Noise barriers on North street have been constructed as a priority to limit potential noise effects on neighbouring residents. Post construction noise monitoring will identify the need for any	Ongoing

SoC – Revised statement of commitments (May 2013)						
No.	**Commitment Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
					additional reasonable and feasible treatments	
NV4	Operational noise monitoring will be undertaken approximately one year after project opening, in accordance with RMS' Environmental Noise Management Manual (RTA, 2001). If monitoring indicates a clear trend that traffic noise levels exceed those predicted, further feasible and reasonable measures will be investigated in consultation with a qualified and experienced acoustic specialist and affected property owners.	Construction and Operation	Fulton Hogan	NA at this stage – relates to operation.	Relates to operation	Ongoing
NV5	The feasibility of constructing noise protection on the western side of Mark Radium Park will be investigated.	Pre-construction and construction	Fulton Hogan	Compliant	The Detailed Design Report: Operational Noise Management (Final design) (March 2015), Section 6.4 assessed the acoustic performance of a potential noise barrier at Mark Radium Park and found construction of a barrier was not reasonable or feasible.	Complete
Biodiversity						
BD1	Areas of vegetation identified to be retained will be managed as environmentally sensitive areas.	Pre-construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5	Ongoing
BD2	Pre-clearing fauna surveys, clearing procedures, including staged clearing where there are hollow trees, and methods to control noxious and environmental weeds and pests will be developed and implemented prior to clearing activities, in consultation with a suitably qualified and experienced ecologist.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendices A and F	Ongoing
BD3	Natural and artificial habitat features, such as bat roost and nest boxes, will be installed to replace hollow-bearing trees that are removed.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendices A	Ongoing
BD4	A fauna monitoring program will be developed in consultation with OEH. This program will allow the assessment of the effectiveness of fauna mitigation measures including nest boxes, bat roost boxes, fauna underpasses, rope bridges and fauna fencing.	Pre-construction, construction and operation	RMS	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendix A Ecological Monitoring Program.	Complete
BD5	Soil that has been stripped, stockpiled and/or reinstated as part of the construction works will be appropriately managed to maintain available seed bank.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendix A Construction Soil and Water Quality Management Sub-plan (Rev D), Appendix F	Ongoing
BD6	Fauna mitigation structures, such as fauna underpasses, fauna overpasses and fauna fencing will be provided where reasonable and feasible. These structures will be designed to assist the safe passage of fauna underneath or over the highway.	Pre-construction, construction and operation	Fulton Hogan	In progress	Fauna Crossings Report (CoA B5).	Ongoing
BD7	Vegetation will be retained, where practicable, under bridges, at temporary creek crossing sites, adjacent to ancillary sites and in the vicinity of rope bridges.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5 and Appendix A. Landscape Drawings	Ongoing
BD8	Permanent and temporary waterway crossings will be designed and constructed in accordance with the fish classification of each waterway.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5	Complete
BD9	A biodiversity offset package will be developed in consultation with the biodiversity offset strategy and in consultation with OEH and DTIRIS. The area of restoration or offsetting would be guided by a simulated assessment of the project impacts and potential offsets using the Bio Banking Assessment Methodology with a minimum of 2:1 for riparian vegetation.	Pre-construction and construction	RMS	Compliant	The Biodiversity Offset Package was approved by DPE on the 3rd May 2017. A timeframe for implementation isn't identified in the BOP, however RMS are currently negotiating BioBanking agreements. BioBanking agreements for two privately owned properties were lodged with OEH in the reporting period.	Ongoing
Surface water and groundwater						
SG1	Water quality measures such as water quality basins, swales or bioretention systems at sensitive receiving environments will be designed and installed to respond to the project water quality design criteria.	Pre-construction and construction	Fulton Hogan	Design compliant; installation in progress.	Construction Soil and Water Quality Management Sub-plan (Rev F), Chapter 5 Detailed Design – Drainage Report	Ongoing
SG2	A design and revegetation strategy for the Town Creek diversion will be developed during detailed design and will include measures to: Maintain flushing efficiency. Mitigate erosion risk at the connection with Bundewallah Creek. The design of the diversion will be finalised in consultation with directly affected landowners. The Town Creek diversion will be stabilised to mitigate erosion risk prior to operation.	Pre-construction and construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report Urban Design and Landscape Plan, March 2016	Complete

SoC – Revised statement of commitments (May 2013)						
No.	**Commitment Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
SG3	Permanent losses to farm dam catchments and inflows will be identified during detailed design. Mitigation strategies will be developed in consultation with affected landowners and implemented where reasonable and feasible.	Pre-construction	RMS/ Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG4	Drinking water drawn from Broughton Creek will be maintained through measures identified in commitment AQ1. In the event that water drawn from Broughton Creek does not meet existing drinking water quality standards, an appropriate source of potable water will be made available to affected residents, following consultation.	Construction	Fulton Hogan	Compliant	Construction Air Quality Management Sub-plan (Rev G), Chapter 5 Residents have been consulted directly during construction about upcoming and ongoing construction activities. Sensitive water receivers are managed through targeted site works and the implementation of specific erosion and sediment controls.	Ongoing
SG5	RMS will consult with landholders along the existing Town Creek alignment, below the proposed diversion, to confirm that there are no Basic Landholder Rights (under the Water Management Act 2000) to access water for domestic or stock purposes.	Pre-construction	RMS	Compliant	RMS consulted with landowners and confirmed no Basic Landholder Rights exist along the Town Creek alignment.	Complete
SG6	Waterway structures will be designed to maintain existing flow regimes, where practicable.	Pre-construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG7	Detailed design will seek to minimise increases in peak flood levels in the 1 in 100 year flood event.	Pre-construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG8	Changes to flood impacts on property will be identified as part of detailed design. Where increased flood impacts to structures, such as residences, are identified, mitigation measures will be proposed and implemented where reasonable and feasible.	Pre-construction and construction	Fulton Hogan	Compliant	Hydrological Mitigation Report complete Detailed Design – Drainage Report complete Regular updates have been provided to the Department regarding implementation of flood mitigation measures and this will continue to occur.	Ongoing
SG9	Impacts on stream channel structure diversion will be minimised during detailed design. Measures to be considered may include culvert sizing, energy dissipation measures, scour protection and other design features to control flow intensity and direction.	Pre-construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG10	Groundwater monitoring of water levels and water quality will be undertaken. Where levels and/or quality indicate that the project is potentially having an adverse impact, mitigation measures will be considered and implemented where reasonable and feasible.	Construction	Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev F), Appendix B Ground water quality monitoring was undertaken on the following dates: - 27 June 2017 – Event 11 Results are provided in Appendix C of this report. Previous groundwater monitoring results identified concentrations of zinc above reference criteria. Additional groundwater monitoring has been undertaken during the past two reporting periods. Follow up monitoring was conducted at three additional up-gradient locations which indicated the previously recorded zinc concentrations were representative of naturally elevated background groundwater quality rather than a result of construction related impacts.	Ongoing
SG11	Water efficient work practices, such as water reuse and recycling for road construction and revegetation irrigation will be implemented, where feasible. In the event that surface water from watercourses or groundwater is required to supply water to the project, a site specific impact assessment will be carried out in consultation with the NSW Office of Water and potentially affected stakeholders.	Construction	Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev F), September 2017, Chapter 5	Ongoing
Landscape character and visual amenity						
VL1	The detailed design will be developed with reference to the minimum reference design requirements and the findings of the CM+ Urban Design Study for the following project components: All bridges within the project, with consideration of the Bridge Aesthetics Design Guidelines (RTA 2003). Embankments across Broughton Creek west of Toolijooa Ridge. Noise attenuation measures barriers along the length of the project.	Pre-construction	Fulton Hogan	Compliant	Urban Design and Landscape Plan, March 2016 Detailed Design - Structures Report	Complete
VL2	Councils and the local community will be engaged during detailed design to receive feedback on an urban and landscape design strategy for the project and the integration of existing pedestrian access and mobility plans for Berry.	Pre-construction	Fulton Hogan	Compliant	Completed during detailed design Detailed Design - Roads Report	Complete
VL3	To respect the rural and historic character of Foxground and Berry, noise barriers and bridges will be designed using forms, materials, colour and texture that are sensitive to the area, that complement the existing rural character and, where possible and desirable, that recede into the landscape. Planting and revegetation will be used to help blend the project into its setting and screen and visually soften built elements.	Pre-construction	Fulton Hogan	Compliant	Urban Design and Landscape Plan, March 2016 In the reporting period the last of the earthworks on the North St noise mound were completed leaving minor landscape plantings to be completed. Native plant stock has been incorporated into the landscape	Ongoing

SoC – Revised statement of commitments (May 2013)						
No.	**Commitment Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
					plantings throughout the rural setting to integrate the project with the surrounding landscape character.	
VL4	Landscaping treatments will include native plant species endemic to the local area and where practicable, locally sourced seed and propagated plant stock will be used to supplement the plant materials required for the project.	Pre-construction and construction	Fulton Hogan	Compliant	Urban Design and Landscape Plan, March 2016	Ongoing
VL5	A lighting strategy and design will be undertaken during detailed design to minimise the impacts of light spill. Detailed design will address mechanisms for reducing the impacts of headlight glare from vehicles travelling on the bridges at Berry and Broughton Creek	Pre-construction	Fulton Hogan	Compliant	Detailed Design - Signage, Linemarking & Road Furniture Report	Complete
Aboriginal heritage						
AH1	Aboriginal sites identified to be conserved will be managed as environmentally sensitive areas.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5 Construction Environmental Management Plan (Rev H), Appendix A6	Ongoing
AH2	Disturbance to the natural soil profile of G2B A13 and G2B A14 will be avoided, where practicable.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5 Alignment Report	Ongoing
AH3	Conduct a program of archaeological salvage at sites G2B A16, G2B A18, G2B A24, G2B A29, G2B A30, G2B A31, G2B A32, G2B A32, G2B A33, G2B A36, and G2B PAD1.	Construction	RMS	Compliant	Archaeological salvage works have been completed on behalf of RMS by the nominated project archaeologist, Kelleher Nightingale Consulting.	Complete
AH4	If any skeletal remains or unknown Aboriginal objects or places are encountered, works that would potentially impact the find will stop immediately. Works will not re-commence until appropriate clearance has been received.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5 and Appendix A	Ongoing
AH5	All construction personnel will receive training in the management of Aboriginal cultural materials, including legal obligations, the application of protocols and the recognition of Aboriginal cultural materials.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Section 6.2	Complete
Non-Aboriginal heritage						
NA1	Mitigation (archival record, test/salvage excavation) will be completed for impacted heritage items.	Pre-construction and construction	RMS	Compliant	Archival recording and detailed historic research complete.	Complete
NA2	An archival recording of Glen Devon (G2B H11) and its grounds will be conducted prior to the commencement of construction	Pre-construction and construction	RMS	Compliant	Archival recording complete	Complete
NA3	Non-Aboriginal sites identified to be conserved will be managed as environmentally sensitive areas.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5	Ongoing
NA4	If any unknown non-Aboriginal heritage items are encountered, all works that would potentially impact the find will stop immediately. Works will not recommence until appropriate clearance has been received.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5 and Appendix A	Ongoing
NA5	An archival record will be prepared for any directly impacted heritage item. Copies will be kept in RMS' library and distributed to the Kiama library and Shoalhaven library (Nowra branch).	Pre-construction and construction (as relevant)	RMS	Compliant	Archival recording completed. Copies to be sent to Kiama and Shoalhaven libraries.	Complete
Land use and property						
P1	Negotiation for all property acquisitions will be in accordance with RMS' Land Acquisition Information Guide (RTA, 2011). Compensation assessment will be in accordance with the Land Acquisition (Just Terms Compensation) Act 1991.	Pre-construction	RMS	Compliant	Complete	Complete
P2	Property access will be maintained during construction. If temporary or alternative access is required, it will be provided in consultation with the affected landowner/s.	Construction.	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Ongoing
P3	Affected property owners will be consulted during detailed design regarding long term access requirements via underpasses.	Pre-construction and construction	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Complete
Socio-economic						
SE1	Negotiations for property acquisition will include consideration of property adjustments, where required, to maintain farm management practices.	Pre-construction	RMS	Compliant	Complete	Complete
SE2	Stock refuge will be maintained at Broughton Creek bridge 2 and will be determined during detailed design in consultation with landowners.	Pre-construction	RMS/ Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2 Detailed Design – Alignment Report	Complete

SoC – Revised statement of commitments (May 2013)						
No.	**Commitment Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
SE3	Appropriate destination signage will be provided near to interchanges.	Operation	Fulton Hogan	N/A at this stage – relates to operation.	Construction Traffic Management Plan (Rev3), Sections 16.3.1 & 16.3.2 Detailed Design - Signage, Linemarking & Road Furniture Report	Ongoing
SE4	Consultation with Shoalhaven City Council will continue through detailed design and construction regarding assistance towards the development of strategies to address the continued economic viability of Berry.	Pre-construction and construction	RMS	Compliant	Ongoing via support of the Berry Strategic Plan via the Berry Forum, recognised by SCC as the official consultative community body – ref: http://berryforum.org.au/strategic-plan/	Ongoing
SE5	Access to recreational facilities will be maintained during construction and operation of the project, where practicable, including consideration of assistance to the relocation of the Berry equestrian centre during construction.	Pre-construction, construction and operation	RMS/ Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Ongoing
SE6	Access to local creeks, including access to the existing Broughton Creek bridge will be maintained during construction and operation to provide access for recreational fishers, where safe and practicable.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2 Detailed Design - Drainage Report	Ongoing
Soil and water quality						
SW1	Management measures will be designed, installed and maintained to minimise erosion and sedimentation from construction activities.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Chapter 5	Ongoing
SW2	A soil conservation specialist will be engaged to provide advice on erosion and sedimentation control.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Chapter 5 SEEC have been engaged as the nominated soil conservationist	Complete
SW3	Stabilisation of exposed areas will be undertaken progressively.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Chapter 5	Ongoing
SW4	Monitoring of water quality upstream and downstream of the project site will be undertaken before and during construction.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix B Surface water quality monitoring was undertaken on the following dates: - 8 June 2017 – Minor Event - 1 August 2017 – Minor Event Water quality monitoring results are attached in Appendix B of this report	Ongoing
SW5	Areas of ASS to be avoided will be fenced and signposted as exclusion zones before and during any works in the vicinity.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix E	Ongoing
SW6	Exposed ASS will be neutralised and surface run-on will be minimised. Any acid runoff or acid material will be contained and treated.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix E	Ongoing
SW7	Targeted soil contamination investigations will be undertaken during detailed design, if required. A remedial action plan will be developed if contamination is found to pose unacceptable risks to the environment and human health.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix C Detailed Design - Geotechnical Report No contamination identified	Complete
Air quality						
AQ1	Standard dust and emission control measures will be implemented to manage construction air quality impacts at sensitive receivers.	Construction	Fulton Hogan	Compliant	Construction Air Quality Management Sub-plan (Rev G), Chapter 5	Ongoing
AQ2	Monitoring will be undertaken to assess the effectiveness of the air quality environmental management measures. Where required, additional feasible and reasonable environmental management measures will be used.	Construction	Fulton Hogan	Compliant	Construction Air Quality Management Sub-plan (Rev G), Section 6.3	Ongoing
Hazards and risks						
HR1	Spills will be contained immediately. Bunded areas within the construction site and ancillary facilities, or other areas where	Pre-construction and	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev	Ongoing

SoC – Revised statement of commitments (May 2013)						
No.	**Commitment Requirement**	**Phase**	**Responsibility**	**Compliance status**	**Compliance notes**	**Close out**
	suitable containment measures are in place to prevent discharge into watercourses, will be used for storage of potentially hazardous and/or contaminating materials and activities.	construction			F), Chapter 5	
HR2	Not used.	NA	NA	NA	NA	NA
HR3	Protection measures for the eastern gas pipeline and suitable construction methods when working in the vicinity of the pipeline will be implemented in consultation with Jemena (Eastern Gas Pipeline).	Pre-construction and construction	Fulton Hogan	Compliant	Detailed Design - Signage, Linemarking & Road Furniture Report	Ongoing
HR4	Permanent water quality basins, swales or other appropriate controls will be designed during the detailed design phase to protect waterways from spills.	Pre-construction and operation	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
Waste and management						
SM1	Not used.	NA	NA	NA	NA	NA
SM2	The waste minimisation hierarchy principles of avoid, reduce, reuse, recycle or dispose will apply to all aspects of the project.	Construction	Fulton Hogan	Compliant	Construction Waste and Energy Management Plan (Rev H), Chapters 4 and 5	Ongoing
Greenhouse gas emissions						
GG 1	Energy efficient work practices will be implemented, including consideration of: Energy efficient design of site buildings. Design of site compounds and the batch plant to minimise unnecessary vehicle movement. Regular servicing of site plant and equipment. Training of construction personnel in energy efficient plant operation. The use of accredited GreenPower. Use of locally sourced materials where available and of suitable quality.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Waste and Energy Management Plan (Rev H), Chapters 4 and 5	Ongoing
Ancillary facilities						
AF1	Ancillary facilities (excluding temporary stockpiles) not identified in the environmental assessment will be located in areas: More than 50 metres from waterways for the active area of the ancillary facility. Where there is no significant clearing of native vegetation beyond that already required for the project. That minimise impact on amenity of the closest sensitive receiver (unless a negotiated agreement is in place). On relatively level ground.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5	Ongoing
AF2	Ancillary chemical storage facilities will be located above the 1 in 100 year flood level unless otherwise identified the construction environmental management plan.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5	Ongoing
AF3	Temporary stockpiles will be located in areas: Of low ecological and heritage conservation significance. At least 50 metres from waterways. Outside the 10 year ARI floodplain. On relatively level ground.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix F	Ongoing

Surface Water Monitoring

Construction Event 24

Monitoring event triggered after 15mm of rainfall was received in 24 hours. This event was of low significance and did not trigger the full suite of analysis as 50mm of rainfall was not received within 24 hours.

Date of Monitoring: 8th June 2017

Rainfall Monitoring is shown below.

Woodhill Mountain Road	
Date:	Rainfall Received:
07/06/2017	24.6mm
08/06/2017	31.6mm

Toolijooa Road	
Date:	Rainfall Received:
07/06/2017	25mm
08/06/2017	28mm

Austral Park	
Date:	Rainfall Received:
07/06/2017	0.4mm
08/06/2017	0.6mm
09/06/2017	40mm

Scope and Limitations

In accordance with the Princes Highway upgrade for Foxground and Berry Bypass (FBB) – Water Monitoring Project Brief, surface water monitoring at seventeen locations (SW01 to SW017) was undertaken. This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services
- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services
- 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

Field parameters were measured during sampling including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction-oxidation potential (redox), and are provided in Table B1, Attachment B. Field sheets are provided in Attachment C.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids.

Weather Monitoring

The project has three weather stations used to monitor weather and rainfall. For the purpose of triggering water quality monitoring events the project uses these weather stations. The locations of the weather stations are:

- The project office on Woodhill Mountain Road, Berry
- Austral Park Road, ancillary facility, Broughton
- Toolijooa Road, Toolijooa,

During the construction phase minor events are classified as at least 15 mm of rainfall in 24 hours and major events are classified as at least 50 mm of rainfall in 24 hours.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results
- Attachment E, Field photographs.

Surface water locations

The upstream location represents the ‘reference’ (un-impacted) site while the down-stream locations represent the ‘test’ sites (potentially impacted sites during construction and operation). By comparing upstream water quality with down-stream water quality potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment	Downstream of Alignment (test
Broughton Creek	SW01	SW02, SW03, SW05
Connelly's Creek and Broughton Mill Creek and Bundewallah Creek	SW04, SW06	SW07, SW09
Bundewallah Creek and Connelly's Creek	SW08	SW06
Town Creek	SW10	SW11
Hitchcocks Lane Creek Tributary	SW12	SW13
Hitchcocks Lane Creek	SW14	SW15
Unnamed Tributary	SW16	SW17

Results summary

The monitoring for this rainfall event was triggered by 15mm of rainfall received in 24 hours. Rainfall continued to fall before and during the monitoring event. The total event volume was ranged from approximately 41mm to 56mm across the project over 3 days. This rainfall has caused medium flows throughout the waterways on the project as it has fallen consistently over 2 days.

No construction impacts were observed during this monitoring event.

Broughton Creek: Showed no impacts from construction

Connelly's Creek and Broughton Mill Creek and Bundewallah Creek: Showed no impacts from construction

Bundewallah Creek and Connelly's Creek: Showed no impacts from construction

Town Creek: Showed no impacts from construction

Hitchcocks Lane Creek Tributary: Showed a heightened TSS and turbidity reading on the upstream end into the site. FH believe that this reading is not construction related. Downstream monitoring location gave a lower TSS and turbidity result.

Hitchcocks Lane Creek: Showed no impacts from construction.

Unnamed Tributary: Showed no impacts from construction.

Attachment A: Location Map

Attachment B: Tabulated Results

Attachment C: Field Sheets

Attachment D: Laboratory Results

Attachment E: Field Photos

1:25,000 (at A3)

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Surface Water Sampling Locations
- Berry to Foxground upgrade alignment
- Roads
- Railways
- Waterways
- Lakes and dams

Fulton Hogan Pty Ltd
Water Quality Monitoring

Job Number	21-24306
Revision	A
Date	03 Mar 2015

Surface water sampling locations — Figure 1

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

No.	Date	Temperature	pH	ORP	Conductivity	Turbidity	Dissolved Oxygen
SW1	8/06/2017	12.60 °C	5.50 pH	244 mV	0.192 mS/cm	10.4 NTU	9.73 mg/L
SW2	8/06/2017	12.53 °C	5.53 pH	296 mV	0.094 mS/cm	15.0 NTU	9.05 mg/L
SW3	8/06/2017	12.37 °C	5.70 pH	287 mV	0.100 mS/cm	21.9 NTU	9.19 mg/L
SW4	8/06/2017	13.07 °C	5.70 pH	237 mV	0.086 mS/cm	8.2 NTU	9.06 mg/L
SW5	8/06/2017	12.40 °C	6.00 pH	297 mV	0.103 mS/cm	25.2 NTU	8.03 mg/L
SW6	8/06/2017	13.76 °C	6.00 pH	235 mV	0.137 mS/cm	11.6 NTU	9.17 mg/L
SW7	8/06/2017	13.27 °C	5.80 pH	273 mV	0.106 mS/cm	11.1 NTU	7.63 mg/L
SW8	8/06/2017	13.86 °C	6.40 pH	219 mV	0.135 mS/cm	15.6 NTU	8.78 mg/L
SW9	8/06/2017	13.79 °C	5.80 pH	255 mV	0.138 mS/cm	10.7 NTU	8.65 mg/L
SW10	8/06/2017	14.32 °C	5.90 pH	251 mV	0.134 mS/cm	15.8 NTU	7.20 mg/L
SW12	8/06/2017	13.22 °C	6.90 pH	204 mV	0.329 mS/cm	248 NTU	6.57 mg/L
SW13	8/06/2017	13.04 °C	6.50 pH	222 mV	0.323 mS/cm	124 NTU	8.72 mg/L
SW14	8/06/2017	14.16 °C	6.20 pH	180 mV	0.138 mS/cm	35.2 NTU	7.93 mg/L
SW15	8/06/2017	13.48 °C	6.20 pH	263 mV	0.206 mS/cm	36.2 NTU	8.20 mg/L
SW16	8/06/2017	13.73 °C	6.10 pH	171 mV	0.165 mS/cm	16.9 NTU	8.73mg/L
SW17	8/06/2017	13.72 °C	6.00 pH	268 mV	0.164 mS/cm	17.4 NTU	8.17 mg/L

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 01

DATE: 8-6-17 TIME: 8:30 am

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Riffle in creek

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: Riperian

SLOPE: Gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.6

CONDUCTIVITY (uS/cm): 192

pH: 5.5

DO (mg/L & %): 9.73

REDOX (mV): 244

TURBIDITY (NTU): 10.4

FLOW OBSERVATIONS

FLOW: Mid

COLOUR: Tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW01	1	ESKY & ICE		

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 02

DATE: 8.6.17 TIME: 8:45

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of weir in pool

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: riperian

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.53

CONDUCTIVITY (uS/cm): 94

pH: 5.53

DO (mg/L & %): 9.05

REDOX (mV): 296

TURBIDITY (NTU): 15.0

FLOW OBSERVATIONS

FLOW: mid

COLOUR: tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW02	1	ESKY & ICE	N	

FIELD SUPERVISOR Jacob Cooper CHECKED (SIGN & DATE) 8.6.17

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 03

DATE: 8.6.17 TIME: 9:10

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION:

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: Riperian

SLOPE: Gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.37

CONDUCTIVITY (uS/cm): 100

pH: 5.7

DO (mg/L & %): 9.19

REDOX (mV): 287

TURBIDITY (NTU): 21.9

FLOW OBSERVATIONS

FLOW:

COLOUR:

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW03	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 04

DATE: 8.6.17 TIME: 13:15

SAMPLING OFFICERS: _____

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: tonga reed waterway

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: riperian

SLOPE: low grade

EROSION: none

OTHER: _____

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.07

CONDUCTIVITY (uS/cm): 86

pH: 5.7

DO (mg/L & %): 9.06

REDOX (mV): 237

TURBIDITY (NTU): 8.2

FLOW OBSERVATIONS

FLOW: mid

COLOUR: tannin

OTHER: _____

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW04	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 05

DATE: 8.6.17 TIME: 9:35

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: widening of creek into ~~stream~~ deep channel

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: Riperian / overgrown agricultural pasture

SLOPE: Gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.4

CONDUCTIVITY (uS/cm): 103

pH: 6.0

DO (mg/L & %): 8.03

REDOX (mV): 297

TURBIDITY (NTU): 25.2

FLOW OBSERVATIONS

FLOW: low

COLOUR: turbid with tannin as well

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW05	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 06

DATE: 8.6.17 TIME: 12:40

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Bundella Gully confluence sampled at the downstream end of confluence

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: riparian

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.76

CONDUCTIVITY (uS/cm): 137

pH: 6.0

DO (mg/L & %): 9.17

REDOX (mV): 235

TURBIDITY (NTU): 11.6

FLOW OBSERVATIONS

FLOW: mid

COLOUR: turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW06	2	ESKY & ICE	Y	
SW06_A				Time: 12:40
SW06_B				Time: 13:00

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 07

DATE: 8.6.17 TIME: 13:45

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: widened channel shallow banks

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: riperan

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.27

CONDUCTIVITY (uS/cm): 106

pH: 5.8

DO (mg/L & %): 7.63

REDOX (mV): 273

TURBIDITY (NTU): 11.1

FLOW OBSERVATIONS

FLOW: mid

COLOUR: tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW07	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 08

DATE: 8.6.17 TIME: 12:20

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Confluence of 2 waterways sampling upstream of confluence

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: Riperian

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.86

CONDUCTIVITY (uS/cm): 135

pH: 6.4

DO (mg/L & %): 8.78

REDOX (mV): 219

TURBIDITY (NTU): 15.6

FLOW OBSERVATIONS

FLOW: Mid

COLOUR: turbid slightly tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW8	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 09

DATE: 8.6.17 TIME: 13:30

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: constricted waterway sampled on elbow

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: Riperian

SLOPE: low grade

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.79

CONDUCTIVITY (uS/cm): 138

pH: 5.8

DO (mg/L & %): 8.65

REDOX (mV): 255

TURBIDITY (NTU): 10.7

FLOW OBSERVATIONS

FLOW: mid

COLOUR: tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW09	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 10

DATE: 8.6.19 TIME: 12:10

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Narrow drainage line

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: agricultural

SLOPE: low grade

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 14.32

CONDUCTIVITY (uS/cm): 134

pH: 5.9

DO (mg/L & %): 7.20

REDOX (mV): 251

TURBIDITY (NTU): 15.8

FLOW OBSERVATIONS

FLOW: mid

COLOUR: slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW10	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 12

DATE: 8.6.17 TIME: 11:55

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Drainage line

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: Overgrown agricultural land

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.22

CONDUCTIVITY (uS/cm): 329

pH: 6.9

DO (mg/L & %): 6.57

REDOX (mV): 204

TURBIDITY (NTU): 248

FLOW OBSERVATIONS

FLOW: Mid

COLOUR: turbid - runoff from estate development

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW12	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 013

DATE: 8.6.17 TIME: 9:50

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Narrow drainage line

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: Grassland

SLOPE: gentle

EROSION: Stripped veg No sign of creek bank erosion

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.04

CONDUCTIVITY (uS/cm): 323

pH: 6.5

DO (mg/L & %): 8.72

REDOX (mV): 222

TURBIDITY (NTU): 124

FLOW OBSERVATIONS

FLOW: Mid

COLOUR: turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW013	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 14

DATE: 8.6.17 TIME: 11:40

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Ephemeral drainage line/drains paddock

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast

VEGETATION: agricultural

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 14.16

CONDUCTIVITY (uS/cm): 138

pH: 6.2

DO (mg/L & %): 7.93

REDOX (mV): 180

TURBIDITY (NTU): 35.2

FLOW OBSERVATIONS

FLOW:

COLOUR:

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW14	1	ESKY & ICE	✓	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 15

DATE: 8.6.17 TIME: 10:30

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Narrow ephemeral dna drainage line

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: agricultural

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.48

CONDUCTIVITY (uS/cm): 206

pH: 6.2

DO (mg/L & %): 8.2

REDOX (mV): 263

TURBIDITY (NTU): 36.2

FLOW OBSERVATIONS

FLOW: low

COLOUR: slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW15	1	ESKY & ICE	N	

FIELD SUPERVISOR

CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 16

DATE: 8.6.17 TIME: 11:20

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Narrow ephemeral drainage line

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: agricultural

SLOPE: low graded

EROSION: Noted undermining of creek bank upstream

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.73

CONDUCTIVITY (uS/cm): 165

pH: 6.1

DO (mg/L & %): 8.73

REDOX (mV): 171

TURBIDITY (NTU): 16.9

FLOW OBSERVATIONS

FLOW: mid

COLOUR: turbid slightly

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW16	1	ESKY & ICE	N	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 17

DATE: 8.6.17 TIME: 10:40

SAMPLING OFFICERS: JC JA

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Ephemeral drainage line

ENVIRONMENTAL OBSERVATIONS

WEATHER: overcast

VEGETATION: agricultural

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.72

CONDUCTIVITY (uS/cm): 164

pH: 6.0

DO (mg/L & %): 8.17

REDOX (mV): 268

TURBIDITY (NTU): 17.4

FLOW OBSERVATIONS

FLOW: Mid

COLOUR: slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW17_A	1	ESKY & ICE	Y	Time 10:40
SW17_B	1			Time 10:55

FIELD SUPERVISOR

CHECKED (SIGN & DATE

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1702593**	Page	: 1 of 7
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR SHANNON CHISHOLM	Contact	: Aneta Prosaroski
Address	: LEVELI 3 - 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW
Telephone	: +61 02 8346 9400	Telephone	: 02 4225 3125
Project	: Foxground and Berry Bypass	Date Samples Received	: 08-Jun-2017 15:48
Order number	: ----	Date Analysis Commenced	: 13-Jun-2017
C-O-C number	: ----	Issue Date	: 16-Jun-2017 17:02
Sampler	: ----		
Site	: ----		
Quote number	: WO/044/15 Blanket Quote		
No. of samples received	: 21		
No. of samples analysed	: 21		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**17920**	**7800E**	**13800W**	**SW01**	**SW02**
			Client sampling date / time	26-May-2017 04:30	25-May-2017 08:45	25-May-2017 00:00	08-Jun-2017 00:00	08-Jun-2017 15:00
Compound	*CAS Number*	*LOR*	*Unit*	**EW1702593-001**	**EW1702593-002**	**EW1702593-003**	**EW1702593-004**	**EW1702593-005**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**20**	**19**	**27**	**10**	**12**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	SW03	SW04	SW05	SW06_A	SW06_B
			Client sampling date / time	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00
Compound	CAS Number	LOR	Unit	EW1702593-006	EW1702593-007	EW1702593-008	EW1702593-009	EW1702593-010
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**15**	**6**	**18**	**9**	**8**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	SW07	SW08	SW09	SW10	SW12
			Client sampling date / time	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00
Compound	CAS Number	LOR	Unit	EW1702593-011	EW1702593-012	EW1702593-013	EW1702593-014	EW1702593-015
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**11**	**13**	**9**	**11**	**95**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	SW15	SW15	SW14	SW16	SW17_A
			Client sampling date / time	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00	08-Jun-2017 15:00
Compound	CAS Number	LOR	Unit	EW1702593-016	EW1702593-017	EW1702593-018	EW1702593-019	EW1702593-020
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**25**	**12**	**13**	**9**	**11**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Client sample ID	**SW17_B**	**----**	**----**	**----**	**----**
				Client sampling date / time	08-Jun-2017 15:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EW1702593-021**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		**7**	**----**	**----**	**----**	**----**

Attachment E: Field Photos

SW01 – Broughton Creek upstream of works

SW02 – Broughton Creek, first site downstream of works

SW03 – Broughton Creek, second site downstream of works

SW05 – Broughton Creek, third and final site downstream of works

SW04 – Broughton Mill Creek, Upstream of works

SW07 – Broughton Mill Creek, downstream of works

SW08 – Bundewallah Creek, Upstream of works

SW06 – Bundewallah Creek, midstream of works

SW09 – Bundewallah Creek, Downstream of works

SW10 – Town Creek, upstream of works

SW11 – Town Creek, Downstream of works

SW12 – Hitchcocks lane creek tributary, upstream of works

SW13 – Hitchcocks lane creek tributary, downstream of works

SW14 – Hitchcocks lane creek, upstream of works

SW15 - Hitchcocks lane creek, downstream of works

SW16 – Unnamed tributary, upstream of works

SW17 – Unnamed tributary, downstream of works

Surface Water Monitoring

Construction Event 25

Monitoring event triggered after 15mm of rainfall was received in 24 hours. This event was of low significance and did not trigger the full suite of analysis as 50mm of rainfall was not received within 24 hours.

Date of Monitoring: 1st August 2017

Rainfall Monitoring is shown below.

Woodhill Mountain Road	
Date:	Rainfall Received:
31/07/2017	0.8mm
01/08/2017	15.6mm

Toolijooa Road	
Date:	Rainfall Received:
31/07/2017	1.4mm
01/08/2017	16.6mm

Austral Park	
Date:	Rainfall Received:
31/07/2017	0.0mm
01/08/2017	22.0mm

Scope and Limitations

In accordance with the Princes Highway upgrade for Foxground and Berry Bypass (FBB) – Water Monitoring Project Brief, surface water monitoring at seventeen locations (SW01 to SW017) was undertaken. This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services
- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services
- 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

Field parameters were measured during sampling including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction-oxidation potential (redox), and are provided in Table B1, Attachment B. Field sheets are provided in Attachment C.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory services (ALS)) to be analysed for:

- Total suspended solids.

Weather Monitoring

The project has three weather stations used to monitor weather and rainfall. For the purpose of triggering water quality monitoring events the project uses these weather stations. The locations of the weather stations are:

- The project office on Woodhill Mountain Road, Berry
- Austral Park Road, ancillary facility, Broughton
- Toolijooa Road, Toolijooa,

During the construction phase minor events are classified as at least 15 mm of rainfall in 24 hours and major events are classified as at least 50 mm of rainfall in 24 hours.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results
- Attachment C, Field sheets
- Attachment D, Laboratory results
- Attachment E, Field photographs.

Surface water locations

The upstream location represents the ‘reference’ (un-impacted) site while the down-stream locations represent the ‘test’ sites (potentially impacted sites during construction and operation). By comparing upstream water quality with down-stream water quality potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	Upstream of Alignment	Downstream of Alignment (test
Broughton Creek	SW01	SW02, SW03, SW05
Connelly's Creek and Broughton Mill Creek and Bundewallah Creek	SW04, SW06	SW07, SW09
Bundewallah Creek and Connelly's Creek	SW08	SW06
Town Creek	SW10	SW11
Hitchcocks Lane Creek Tributary	SW12	SW13
Hitchcocks Lane Creek	SW14	SW15
Unnamed Tributary	SW16	SW17

Results summary

The monitoring for this rainfall event was triggered by 15mm of rainfall received in 24 hours. Rainfall continued to fall before and during the monitoring event. The total event volume was ranged from approximately 15mm to 22mm across the project over 1 day. This rainfall has not significantly impacted the flows through the waterways on the project as rainfall has been significantly lower over the past month and as a result runoff was much lower than the typically observed conditions.

No construction impacts were observed during this monitoring event.

It is to be noted that sites SW12, SW14 and SW15 were not sampled as no flow was observed in these locations.

Broughton Creek: Showed no impacts from construction. Conductivity at SW05 was recorded as being higher than previous events. This was attributed to an increase in salinity due to tidal influence and low freshwater flows from the upstream catchment.

Connelly's Creek and Broughton Mill Creek and Bundewallah Creek: Showed no impacts from construction

Bundewallah Creek and Connelly's Creek: Showed no impacts from construction

Town Creek: Showed no impacts from construction

Hitchcocks Lane Creek Tributary: Showed no impacts from construction. The upstream reference site SW12 was unable to be sampled as no flows were observed.

Hitchcocks Lane Creek: Showed no impacts from construction. Sampling did not occur at the upstream reference site SW14 or at the downstream site SW15 due to no flow being observed in the waterway.

Unnamed Tributary: Showed no impacts from construction.

Attachment A: Location Map

Attachment B: Tabulated Results

Attachment C: Field Sheets

Attachment D: Laboratory Results

Attachment E: Field Photos

1:25,000 (at A3)

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Surface Water Sampling Locations
- Berry to Foxground upgrade alignment
- Roads
- Railways
- Waterways
- Lakes and dams

Fulton Hogan Pty Ltd
Water Quality Monitoring

Job Number	21-24306
Revision	A
Date	03 Mar 2015

Surface water sampling locations — Figure 1

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

No.	Date	Temperature	pH	ORP	Conductivity	Turbidity	Dissolved Oxygen
SW1	1/08/2017	10.95 °C	6.1 pH	203 mV	0.152 mS/cm	1.4 NTU	8.43 mg/L
SW2	1/08/2017	10.76 °C	6.3 pH	212 mV	0.150 mS/cm	1.6 NTU	7.6 mg/L
SW3	1/08/2017	11.35 °C	7.0 pH	127 mV	0.180 mS/cm	2.3 NTU	7.19 mg/L
SW4	1/08/2017	11.24 °C	7.1 pH	122 mV	0.137 mS/cm	3.0 NTU	7.2 mg/L
SW5	1/08/2017	13.20 °C	6.7 pH	43 mV	10.700 mS/cm	3.2 NTU	2.78 mg/L
SW6	1/08/2017	11.89 °C	7.0 pH	160 mV	0.193 mS/cm	4.1 NTU	5.85 mg/L
SW7	1/08/2017	11.93 °C	6.9 pH	177 mV	0.154 mS/cm	3.4 NTU	6.17 mg/L
SW8	1/08/2017	11.35 °C	7.1 pH	75 mV	0.176 mS/cm	7.2 NTU	7.76 mg/L
SW9	1/08/2017	12.41 °C	7.0 pH	131 mV	0.181 mS/cm	2.5 NTU	6.75 mg/L
SW10	1/08/2017	11.71 °C	7.3 pH	142 mV	0.226 mS/cm	10.9 NTU	5.95 mg/L
SW12	1/08/2017						
SW13	1/08/2017	12.80 °C	7.8 pH	69 mV	0.485 mS/cm	6.5 NTU	7.84 mg/L
SW14	1/08/2017						
SW15	1/08/2017						
SW16	1/08/2017	12.18 °C	7.3 pH	48 mV	0.196 mS/cm	0.5 NTU	7 mg/L
SW17	1/08/2017	12.88 °C	7.4 pH	94 mV	0.219 mS/cm	3.8 NTU	7.75 mg/L

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 01

DATE: 1/8/17 TIME: 0845

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of riffle in large pool

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny light/mod wind

VEGETATION: Riparian

SLOPE: Gentle

EROSION: None

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 10.95

CONDUCTIVITY (uS/cm): ~~0.152~~ 152

pH: 6.1

DO (mg/L & %): 3.43

REDOX (mV): 203

TURBIDITY (NTU): 1.4

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: lightly tannin

OTHER: No odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW01	1	ESKY & ICE	–	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 02

DATE: 1/8/17 TIME: 0905

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Downstream of weir adjacent to flow path

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: riparian

SLOPE: Gentle

EROSION: -

OTHER: -

FIELD MEASUREMENTS

TEMPERATURE (OC): 10.76

CONDUCTIVITY (uS/cm): 150

pH: 6.3

DO (mg/L & %): 7.6

REDOX (mV): 212

TURBIDITY (NTU): 1.6

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: very light tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW02	1	ESKY & ICE	-	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 03

DATE: 1/8/17 TIME: 1255

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: riffle

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian, Agricultural

SLOPE: gentle

EROSION: -

OTHER: -

FIELD MEASUREMENTS

TEMPERATURE (OC): 11.35

CONDUCTIVITY (uS/cm): 180

pH: 7.0

DO (mg/L & %): 7.19

REDOX (mV): 127

TURBIDITY (NTU): 2.3

FLOW OBSERVATIONS

FLOW: low velocity flow

COLOUR: slightly tannin

OTHER: -

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW03_1	1	ESKY & ICE		
SW03_2	1		Yes	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 04

DATE: 1/6/24 TIME: 1010

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Edge of pool just before riffle

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian

SLOPE: gentle

EROSION: –

OTHER: –

FIELD MEASUREMENTS

TEMPERATURE (OC): 11.24

CONDUCTIVITY (uS/cm): 137

pH: 7.1

DO (mg/L & %): 7.2

REDOX (mV): 122

TURBIDITY (NTU): 3.0

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: slightly tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW04	1	ESKY & ICE	–	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 05

DATE: 1/8/17 TIME: 0953

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: wide, deep section of waterway

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, light wind

VEGETATION: Riparian, some woody weeds

SLOPE: gentle

EROSION: -

OTHER: -

FIELD MEASUREMENTS

TEMPERATURE (OC): 13.2

CONDUCTIVITY (uS/cm): 10700

pH: 6.7

DO (mg/L & %): 2.78

REDOX (mV): 43

TURBIDITY (NTU): 3.2

FLOW OBSERVATIONS

FLOW: Very low velocity

COLOUR: Slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW05	1	ESKY & ICE	-	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 06

DATE: 1/8/17 TIME: 1035

SAMPLING OFFICERS: SA, SC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: midway in large pool

ENVIRONMENTAL OBSERVATIONS

WEATHER: sunny light wind

VEGETATION: Riparian

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 11.89

CONDUCTIVITY (uS/cm): 193

pH: 7.0

DO (mg/L & %): 5.85

REDOX (mV): 160

TURBIDITY (NTU): 4-1

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: slightly tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW06	1	ESKY & ICE	—	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 07

DATE: 1/8/17 TIME: 1050

SAMPLING OFFICERS: SA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: large pool

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, light wind

VEGETATION: Riparian, some woody weeds

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 11.93

CONDUCTIVITY (uS/cm): 154

pH: 6.9

DO (mg/L & %): 6.17

REDOX (mV): 177

TURBIDITY (NTU): 3.4

FLOW OBSERVATIONS

FLOW: Very low velocity

COLOUR: lightly tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW07	1	ESKY & ICE	–	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW SW08

DATE: 18/7/17 TIME: 1110

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Main Channel

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny light wind

VEGETATION: Riparian with woody weeds + Agricultural adjacent

SLOPE: gentle

EROSION: None

OTHER: –

FIELD MEASUREMENTS

TEMPERATURE (OC): 11.35

CONDUCTIVITY (uS/cm): 176

pH: 7.1

DO (mg/L & %): 7.76

REDOX (mV): 75

TURBIDITY (NTU): 7.2

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW08	1	ESKY & ICE	–	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 09

DATE: 1/8/14 TIME: 1020

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Small pool after riffle

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: Riparian, some weedy

SLOPE: gentle

EROSION: none

OTHER: -

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.41

CONDUCTIVITY (uS/cm): 181

pH: 7.0

DO (mg/L & %): 6.75

REDOX (mV): 131

TURBIDITY (NTU): 2.5

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: slightly tannin

OTHER: some scum observed on edge of pool.

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW09	1	ESKY & ICE	-	

FIELD SUPERVISOR CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 10

DATE: 1/8/17 TIME: 1125

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Channel upstream of pond

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, light wind

VEGETATION: Agricultural

SLOPE: gently

EROSION: None

OTHER: –

FIELD MEASUREMENTS

TEMPERATURE (OC): 11.71

CONDUCTIVITY (uS/cm): 226

pH: 7.3

DO (mg/L & %): 5.95

REDOX (mV): 142

TURBIDITY (NTU): 10.9

FLOW OBSERVATIONS

FLOW: very low velocity (almost 0)

COLOUR: Slightly turbid

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW10	1	ESKY & ICE	–	

FIELD SUPERVISOR CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 12

DATE: 1/8/17 TIME: 1140

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: No sample taken due to low(0) flow

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, light wind

VEGETATION: riparian / swampy

SLOPE: gentle

EROSION: None

OTHER: 0 flow

FIELD MEASUREMENTS

TEMPERATURE (OC): –

CONDUCTIVITY (uS/cm): –

pH: –

DO (mg/L & %): –

REDOX (mV): –

TURBIDITY (NTU): –

FLOW OBSERVATIONS

FLOW: 0 - no sample

COLOUR:

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
None	0	ESKY & ICE		

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 13

DATE: 1/8/17 TIME: 1200

SAMPLING OFFICERS: JA, SC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: main channel

ENVIRONMENTAL OBSERVATIONS

WEATHER: sunny light wind

VEGETATION: Riparian + grassland

SLOPE: gentle

EROSION: none

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.80

CONDUCTIVITY (uS/cm): 485

pH: 7.8

DO (mg/L & %): 7.84

REDOX (mV): 69

TURBIDITY (NTU): 6.5

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: Clear, slight tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW13	1	ESKY & ICE	-	

FIELD SUPERVISOR

CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 14

DATE: 1/3/17 TIME: 1240

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: No sample as no flow was observed

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, light wind

VEGETATION: Agricultural

SLOPE: gentle

EROSION: None

OTHER:

FIELD MEASUREMENTS

TEMPERATURE (OC): –

CONDUCTIVITY (uS/cm): –

pH: –

DO (mg/L & %): –

REDOX (mV): –

TURBIDITY (NTU): –

FLOW OBSERVATIONS

FLOW: No flow

COLOUR: –

OTHER: No flow observed and no sample was taken

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
0	0	ESKY & ICE	–	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 15

DATE: 1/8/17 TIME: 1150

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: No flow

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny

VEGETATION: long grass

SLOPE: Gentle

EROSION: —

OTHER: —

FIELD MEASUREMENTS

TEMPERATURE (OC): —

CONDUCTIVITY (uS/cm): —

pH: —

DO (mg/L & %): —

REDOX (mV): —

TURBIDITY (NTU): —

FLOW OBSERVATIONS

FLOW: No flow (No sample taken)

COLOUR: —

OTHER: —

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
0	0	ESKY & ICE		

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 16

DATE: 1/8/17 TIME: 1225

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: riffle below small pool

ENVIRONMENTAL OBSERVATIONS

WEATHER: sunny light wind

VEGETATION: grassland / agricultural

SLOPE: gentle

EROSION: -

OTHER: -

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.18

CONDUCTIVITY (uS/cm): 196

pH: 7.3

DO (mg/L & %): 7.00

REDOX (mV): 48

TURBIDITY (NTU): 0.5

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: Clear, Slightly tannin

OTHER:

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW16	1	ESKY & ICE	-	

FIELD SUPERVISOR

CHECKED (SIGN & DATE

Fulton Hogan

FOXGROUND AND BERRY BYPASS
SURFACE WATER SAMPLING RECORD

SITE: SW 17

DATE: 1/8/17 TIME: 1215

SAMPLING OFFICERS: JA, JC

SAMPLING METHOD *(ie grab, bucket)*: GRAB

DETAILED SAMPLE LOCATION DESCRIPTION: Pool just before @ riffle

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, moderate breeze

VEGETATION: Minimal, grassland and woody weeds

SLOPE: gentle

EROSION: none

OTHER: —

FIELD MEASUREMENTS

TEMPERATURE (OC): 12.88

CONDUCTIVITY (uS/cm): 219

pH: 7.4

DO (mg/L & %): 7.75

REDOX (mV): 94

TURBIDITY (NTU): 3.8

FLOW OBSERVATIONS

FLOW: low velocity

COLOUR: Clear

OTHER: algael growth in pool high. No site runoff as catchment is stabilised.

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW17_1	1	ESKY & ICE		
SW17_2	1		Yes	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1703294**	Page	: 1 of 5
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: JACOB COOPER	Contact	: Aneta Prosaroski
Address	: LEVELI 3 - 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW
Telephone	: +61 02 8346 9400	Telephone	: 02 4225 3125
Project	: Foxground and Berry Bypass	Date Samples Received	: 01-Aug-2017 16:30
Order number	: ----	Date Analysis Commenced	: 07-Aug-2017
C-O-C number	: ----	Issue Date	: 09-Aug-2017 09:28
Sampler	: JACOB COOPER		
Site	: ----		
Quote number	: WO/044/15 Blanket Quote		
No. of samples received	: 15		
No. of samples analysed	: 15		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW01**	**SW02**	**SW05**	**SW04**	**SW09**
			Client sampling date / time	01-Aug-2017 08:45	01-Aug-2017 09:05	01-Aug-2017 09:50	01-Aug-2017 10:10	01-Aug-2017 10:20
Compound	*CAS Number*	*LOR*	*Unit*	**EW1703294-001**	**EW1703294-002**	**EW1703294-003**	**EW1703294-004**	**EW1703294-005**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	SW06	SW07	SW08	SW10	SW13
			Client sampling date / time	01-Aug-2017 10:35	01-Aug-2017 10:50	01-Aug-2017 11:10	01-Aug-2017 11:25	01-Aug-2017 12:00
Compound	CAS Number	LOR	Unit	EW1703294-006	EW1703294-007	EW1703294-008	EW1703294-009	EW1703294-010
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**6**	**6**	**7**	**9**	**6**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	SW17_1	SW17_2	SW16	SW03_1	SW03_2
			Client sampling date / time	01-Aug-2017 12:20	01-Aug-2017 12:20	01-Aug-2017 12:30	01-Aug-2017 12:50	01-Aug-2017 12:50
Compound	*CAS Number*	*LOR*	*Unit*	**EW1703294-011**	**EW1703294-012**	**EW1703294-013**	**EW1703294-014**	**EW1703294-015**
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	**10**	<5	<5	<5

Attachment E: Field Photos

SW01 – Broughton Creek upstream of works

SW02 – Broughton Creek, first site downstream of works

SW03 – Broughton Creek, second site downstream of works

SW05 – Broughton Creek, third and final site downstream of works

SW04 – Broughton Mill Creek, Upstream of works

SW07 – Broughton Mill Creek, downstream of works

SW08 – Bundewallah Creek, Upstream of works

SW06 – Bundewallah Creek, midstream of works

SW09 – Bundewallah Creek, Downstream of works

SW10 – Town Creek, upstream of works

SW11 – Town Creek, Downstream of works

SW12 – Hitchcocks lane creek tributary, upstream of works

SW13 – Hitchcocks lane creek tributary, downstream of works

SW14 – Hitchcocks lane creek, upstream of works

SW15 - Hitchcocks lane creek, downstream of works

SW16 – Unnamed tributary, upstream of works

SW17 – Unnamed tributary, downstream of works

28 August 2017

James Diamond
Environmental Coordinator
Fulton Hogan Construction Pty Ltd
P.O. Box 353
Berry NSW 2535

Our ref: 21/24306
220377

Dear James,

Groundwater Monitoring Event
Construction Event 11

1 Scope and limitations

In accordance with the Princes Highway upgrade for Foxground and Berry Bypass (FBB) - Water Monitoring Project Brief (*Contract No. 12.2574.3019)*, GHD Pty Ltd (GHD) completed a quarterly round of groundwater quality monitoring at locations adjacent to current works at the site.

GHD was able to monitor six wells at locations MW01, MW04, MW09, MW10, MW12 and MW16. This sampling event did not include the up-gradient monitoring well locations, which were monitored on a temporary basis during Events 8 and 9.

Groundwater elevations have also been monitored using groundwater pressure loggers at MW03, MW08, MW13 and MW16. A barometric pressure gauge installed at the Fulton Hogan compound located on Woodhill Mountain Road, Berry has been used to filter barometric effects from the data.

This letter report documents the findings of the eleventh groundwater monitoring event (Event 11) undertaken since the commencement of construction.

2 Field and Analytical Program

The groundwater sampling was undertaken at the six nominated groundwater monitoring wells on 27 June 2017; refer to Figure 1, Attachment A, depicting the monitoring well locations. This monthly groundwater sampling event was conducted in accordance with the sampling program and protocols provided in the following documents:

- GHD 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Water Quality Monitoring Groundwater Monitoring Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

Groundwater field parameters were measured during sampling including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO) and reduction-oxidation potential (redox). The readings are summarised in Table B1, Attachment B. GHD's detailed field record sheets and calibration certificates are provided in Attachment C and indicate suitable calibration of the water quality meter prior to use.

Water samples were submitted to a National Association of Testing Authorities (NATA) certified testing laboratory (Eurofins | Mgt) with the following analysis undertaken:

- Total Petroleum Hydrocarbons (TPH) NEPM 1999 and Total Recoverable Hydrocarbons (TRH) NEPM 2013.
- Benzene, Toluene, Ethyl-benzene, Xylene and Naphthalene (BTEXN).
- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) dissolved.

Each sample was field filtered prior to laboratory analysis for heavy metals.

One duplicate sample was collected (labelled DUPL_1), from well MW16.

3 Results and Discussion

This section presents control charts and discusses results (with regard to exceedances of criteria or inconsistencies in the groundwater results for Event 11) in accordance with the following:

- GHD's letter report limitations provided in Section 4.
- GHD 2014, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

3.1 Groundwater Elevations

The rainfall within Broughton Creek catchment and the groundwater elevations within monitored wells are presented in Figure 2, Attachment A. The rainfall data was obtained from the NSW Office of Water website (http://realtimedata.water.nsw.gov.au/water.stm).

The recorded groundwater levels indicate the majority of wells are relatively stable. Previously groundwater elevations at MW01 had stabilised since construction began at a higher elevation however the previous three gauging records have shown a decrease that has since returned to a higher elevation for this monitoring round. A decrease in groundwater elevation is an expected response to construction activities near to MW01. A clear longer-term construction response in groundwater elevations is not evident in MW04, MW10, MW12 and MW16. There was a decrease in groundwater elevation at MW09 between Event 5 to Event 6, however, elevations have remained relatively stable during the last six events.

The manually recorded groundwater elevations for all wells monitored, including those with data loggers installed are presented in Table 1 below.

Table 1 Manual groundwater observations for monitoring Event 10

Well ID	Well Depth (m)	Well Elevation (m AHD)	Groundwater Elevation (m btoc)	Groundwater Elevation (m AHD)
MW01	22.880	51.99	1.870	50.12
MW03	21.800	102.93	16.983	85.95
MW04	7.572	80.01	1.410	78.60
MW07	30.000	58.61	-	-
MW08	9.875	28.59	1.753	26.84
MW09	10.050	32.34	6.095	26.25
MW10	14.840	32.30	10.645	21.66
MW11	36.100	60.09	-	-
MW12	10.665	24.39	6.260	18.13
MW13	14.800	49.94	8.350	41.59
MW16	10.755	22.82	1.304	21.52

Notes:
m btoc = metres below top of casing
m AHD = metres above Australian height datum

3.2 Groundwater Quality Sampling Results

There were no visual or olfactory signs of contamination observed at any of the sampling points during the groundwater investigation. Groundwater was generally observed to be clear to cloudy (grey or brown) or turbid grey.

In situ water quality parameters measured during sampling are presented in Table B1, Attachment B.

Groundwater laboratory analytical results for the suite listed in Section 2 are tabulated against selected criteria (in accordance with the protocols detailed in Section 2) in Table B2, Attachment B. Laboratory documents are provided in Attachment D.

Groundwater quality parameters and chemical concentrations outside of the ranges present within the screening criteria are summarised in Table 2. The findings suggest groundwater quality is above the screening criteria at a number of locations throughout the catchment for pH, electrical conductivity, copper and zinc. All monitoring locations exceeded the adopted ecological freshwater screening criteria for zinc except for locations MW09. No locations exceeded the adopted ecological freshwater criteria for arsenic, cadmium, chromium, lead, mercury or nickel. All locations' metals concentrations were also below selected drinking water criteria. Several of the electrical conductivity and the pH results were outside of the aesthetic criteria listed in the Australian Drinking Water Guidelines (ADWG, 2011) and lowland rivers (ANZECC, 2000) criteria indicating the groundwater is not suitable from an aesthetic drinking water perspective. All results are below the ANZECC stock watering criteria indicating suitability for this purpose.

Table 2 Summary of Water Quality Screening

Analyte	Units	Screening Criteria	No. Locations Exceeding Adopted Criteria	Minimum value	Maximum value
pH (field)	pH units	6.5 - 8.5 (ADWG Aesthetic) and 6.5 – 8.0 (Lowland Rivers ANZECC 2000)	5	5.47 (MW12)	6.28 (MW09)
Electrical Conductivity (field)	us/cm	890 (ADWG Aesthetic) and 300 (Lowland Rivers ANZECC 2000)	3 (ADWG) 5 (Lowland Rivers)	388.6 (MW12)	2789 (MW01)
Zinc dissolved (laboratory)	mg/L	0.008 (ANZECC 2000 Freshwater 95%)	5+ QA sample	0.009 (MW04, MW16)	0.033 (MW01)
Copper dissolved (laboratory)	mg/L	0.0014 (ANZECC 2000 Freshwater 95%)	4 + QA sample	0.002 (MW12, MW16, MW01)	0.006 (MW04)

The majority of the exceedances of criteria were also reported during the pre-construction phase of monitoring. Additional discussion of the results with regard to pre-construction data is provided in Sections 3.2.1 and 3.2.2.

An assessment of the field quality control sampling is provided in Table B3. No unacceptable difference in the primary (MW16) and duplicate sample (DUPL_01) analysed were found.

A discussion of the field and laboratory quality assurance and quality control findings is provided in Attachment E.

3.2.1 Control Charts

In accordance with the assessment criteria documented in the monitoring plans and summarised in Section 2, control charts have been developed for specific analytes and are presented in Attachment F. These control charts are discussed further below.

Electrical Conductivity (field)

The groundwater control charts compare pre-construction (reference) data with construction and operation (test) data. The 'reference' data is presented as an 80th percentile of the pre-construction monitoring, while the 'test' data represent the median of the construction sampling. The control charts for Event 11 are presented in Attachment F.

The electrical conductivity control chart has an upper threshold 80th percentile limit. Location MW09 had an increase in electrical conductivity during Event 11, returning to a value previously seen approximately one year ago. MW04 continues to have a stable electrical conductivity. Both MW09 and MW04 are below the pre-construction 80th percentile. Location MW01 had a reduction in electrical conductivity, returning to a value seen at a similar time approximately one year ago and was below the pre-construction 80th percentile. Well MW10 increased back to a value previously seen approximately one year ago. MW16 continues to decrease slightly since Event 9 and MW12 has increased in electrical conductivity to levels previously seen in Event 8 and 9. Wells MW10, MW12 and MW16 are below the pre-construction 80th percentile.

pH (field)

The pH control charts vary from the method used for electrical conductivity because there is a criteria range for assessing pH water quality as opposed to an upper threshold value. This limits the value of comparing pH changes to an 80th percentile baseline value in the control chart. As such, the actual data has been compared against the Australian Drinking Water Guidelines (ADWG 2011) of 6.5 – 8.5 pH units for drinking water and the lowest pH baseline value for each well recorded before construction (baseline data). It is noted that the ecological values for lowland rivers in south east Australia ranges between pH units of 6.5 and 8.0. This method also allows characterisation of the pH relative to the baseline (pre-construction) data and the adopted screening criteria.

The control chart for MW01 has decreased from the previous monitoring event at the location (Event 9) and is above the ADWG (2011) low range screening criteria value although remains below the minimum baseline (pre-construction) value. The pH level in MW04 increased slightly from the last event and remains below the ADWG (2011) and above the minimum baseline value.

The pH in MW09 decreased over the last monitoring event to a concentration below the ADWG (2011) and below the minimum baseline value for this well. Similar values in MW09 for Event 11 were last seen in July 2015. The pH in MW10 decreased from consistent concentrations over the past four events to a concentration below the ADWG (2011) and below the minimum baseline value. A similar value was last seen in April 2015. These results are outside the criteria set for the project.

MW12 and MW16 results are outside of ADWG (2011) screening criteria although they both remain above the minimum baseline values reported before construction.

The remaining analytes with detectable concentrations have been assessed using other methods and are discussed in the following sections.

3.2.2 Results Graphs

The concentrations for dissolved heavy metals (with detectable concentrations) were plotted in time series to assess the changes pre- and during construction and the emergence of trends. Control charts were considered unsuitable in this instance as the metals data generally has a high percentage of values below detection limits. This resulted in identified exceedances in the control charts that were associated with statistical issues rather than trends in the data. Time series graphs of the results were created for the following metals (which had detectable concentrations):

- Nickel.
- Copper.
- Arsenic.
- Zinc.

The results graphs for Event 11 are presented in Attachment F and are summarised below.

Nickel and Arsenic

The results graphs for nickel and arsenic are below the selected human health and ecological criteria. Further to this, with the inclusion of the latest results, there does not appear to be any increasing trends. Concentrations of nickel in MW04 and MW12 have increased slightly for this event.

Copper

The copper results graphs for wells MW12, MW16 and MW01 have increased from undetectable values in almost all previous events to a value of 0.002 mg/L and slightly above the ANZECC (2000) screening criteria. MW04 has increased significantly from the last event to its highest value since construction

began and is above ANZECC (2000) criteria. The copper concentration in MW09 decreased to less than the limit of reporting (LOR) levels after a spike in concentration in the last event. The value in the previous event (Event 10) appears to be an anomalous result and not part of an emerging trend, however, subsequent monitoring will characterise this further.

Zinc

All wells monitored during Event 11, other than MW09, have zinc concentrations above the selected ANZECC (2000) freshwater aquatic ecosystem criteria for the protections of aquatic ecosystems (there is no human health value for zinc) and elevated concentrations relative to pre-construction conditions (pre-December 2014).

MW16 has had a decrease in zinc concentration relative to Event 9 and 10 and is comparable to Event 5 recorded more than a year ago in March 2016. The concentration remains slightly elevated when compared with baseline (pre-construction). There is more variability in the data over the construction period.

MW04 has higher zinc concentration relative to Event 10, similar to the zinc concentration recorded during Event 9. Zinc values in MW04 suggest a high variability during construction. The concentration reported for Event 11 is generally at, or within, the range of baseline conditions and is slightly above the ANZECC (2000) criteria. There is more variability in the data over the construction period.

MW09 had a decrease in zinc concentrations from Event 10 and is below the selected ecological screening criteria with a concentration similar to the pre-construction concentrations.

MW10 has had an increase in zinc concentration compared to the last event. Zinc concentration continues to fluctuate above the selected criteria.

Zinc concentration at MW12 has had a slight increase during this event, with Zinc concentrations continuing to fluctuate since construction began.

Overall the data sets indicate an increase in overall zinc concentration and variability, but any upward trends appear to have plateaued and/or have slightly declined through 2016 and 2017.

Previous monitoring events that included monitoring of up and down gradient wells suggests that the increased concentrations and variability observed in down gradient wells since construction are associated with background variability rather than construction.

TPH

TPH C_{15}-C_{36} was identified in well MW12 at a concentration of 3 mg/L, which is well above the LOR. This is the first detectable concentration of TPH reported across the site since sampling began.

3.3 Recommendations

pH results for MW09 and MW10 have fallen outside the adopted criteria. If these trends continue in the subsequent monitoring events further consideration of the cause for the change will be required.

Copper concentrations at MW04 should be evaluated after the next monitoring event to better understand whether this result is an anomaly associated with background variability or an ongoing trend requiring further characterisation.

TPH (fractions >C_{15}) has been detected at concentrations well above the detection limit in MW12. If this continues in the subsequent monitoring events further consideration of the cause for the change will be required. Completion of silica gel clean-up on TPH analysis from following sampling events will provide additional information on the contribution from sources other than petroleum.

The next groundwater sampling event (Event 12) will be completed in September 2017.

4 Limitations

This report has been prepared by GHD Pty Ltd (GHD) for Fulton Hogan and may only be used and relied on by Fulton Hogan for the purpose agreed between GHD and the Fulton Hogan as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Fulton Hogan arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Fulton Hogan and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Please contact the undersigned if you have any questions or require further information.

Kind Regards,

Jane Curran
Environmental Scientist
02 4424 4960

Stefan Charteris
Principal Hydrogeologist
02 9239 7472

Attachment A - Figures

1:25,000 (at A3)

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Groundwater Sampling Locations
- Berry to Foxground upgrade alignment
- Roads
- Railways
- Waterways
- Lakes and dams

Roads and Maritime Services
Water Quality Monitoring

Job Number	61-24306
Revision	A
Date	11 Nov 2016

Groundwater Sampling Locations

Figure 1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Figure 2: Foxground to Berry Bypass Groundwater and Rainfall Observations

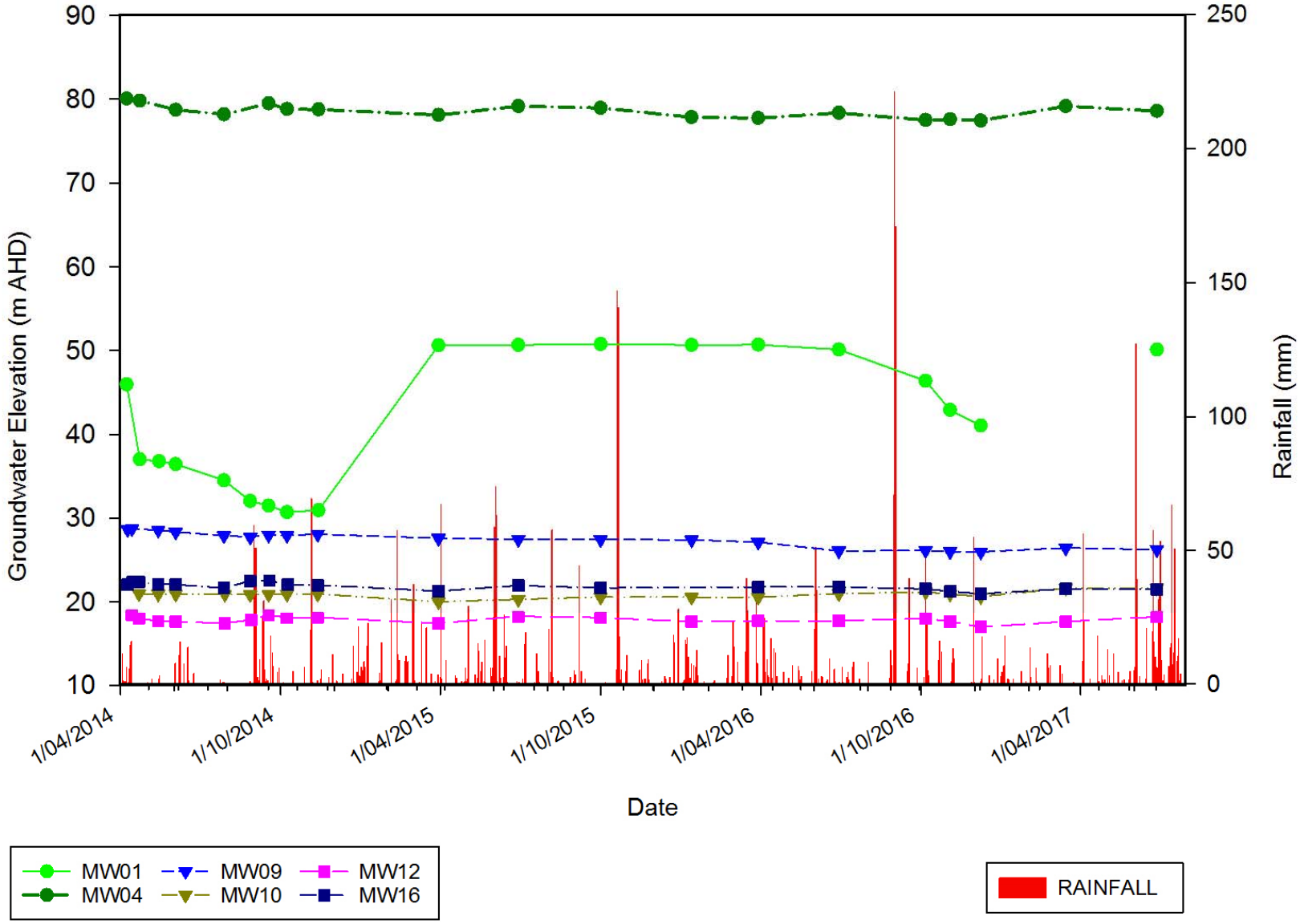
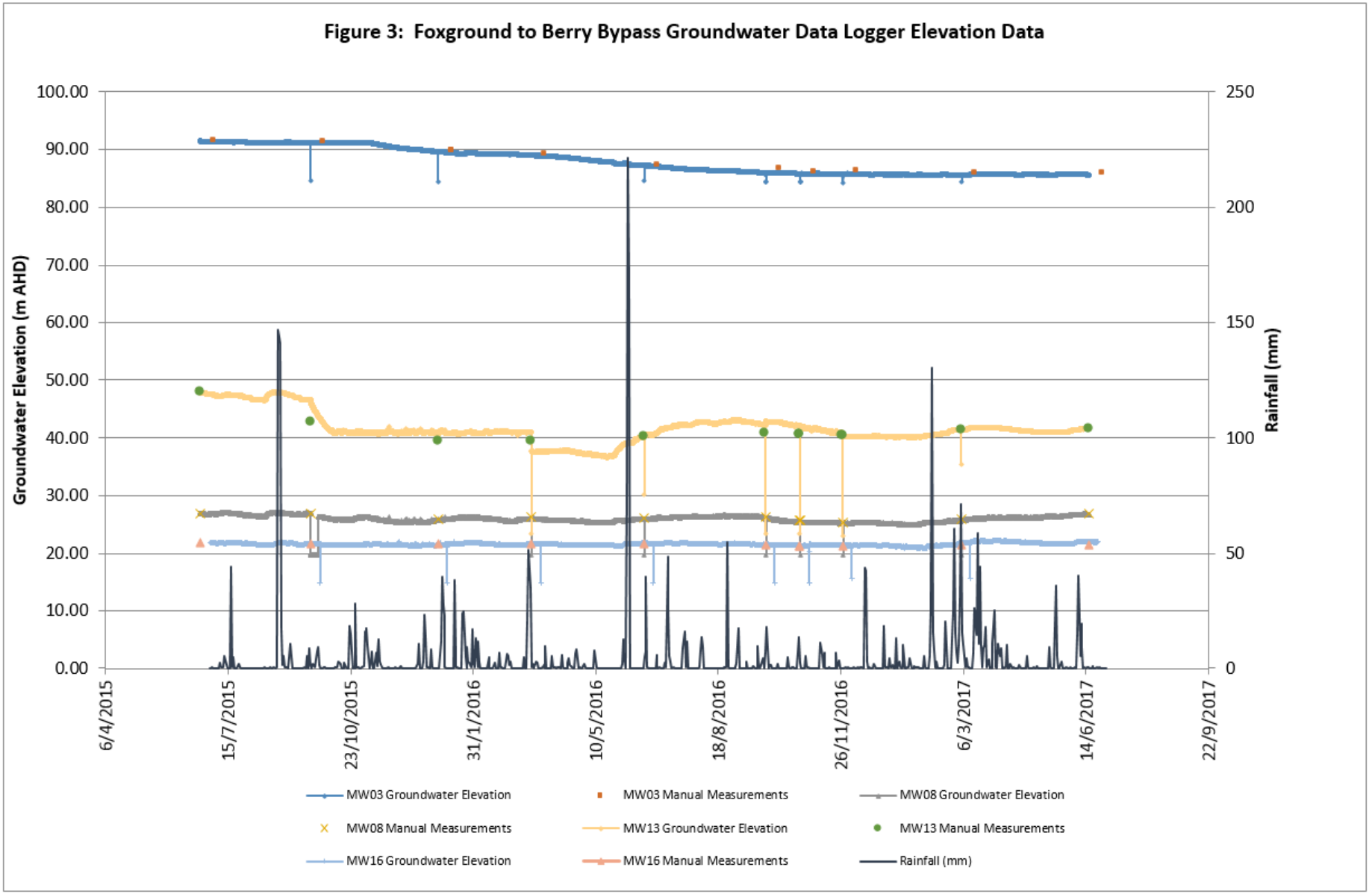


Figure 3: Foxground to Berry Bypass Groundwater Data Logger Elevation Data



Attachment B - Tabulated Results

Appendix B
Table B1
Event 11- Field Parameters

				Field				
				Dissolved Oxygen (Field) (Filtered	Electrical Conductivity (Field)	pH (Field)	Redox	Temp (Field)
				mg/L	µS/cm	pH Units	mV	oC
EQL								
ADWG 2011 Aesthetic					890[#2]	6.5-8.5[#1]		
ADWG 2011 Health								
ANZECC 2000 - Stock Watering								
ANZECC 2000 FW 95%								
Lowland rivers (ANZECC 2000)					300	6.5-8		
SampleCode	**Field_ID**	**LocCode**	**Sampled_Date-Time**					
MW01_27 Jun 17_-	MW01	MW01	27/06/2017	0.09	2789	7.04	168.6	16.2
MW04_27 Jun 17_-	MW04	MW04	27/06/2017	3.04	150.5	6.13	174.4	16.1
MW09_27 Jun 17_-	MW09	MW09	27/06/2017	0.53	1724	6.28	163.2	19.1
MW10_27 Jun 17_-	MW10	MW10	27/06/2017	0.74	2575	6.16	167.8	17
MW12_27 Jun 17_-	MW12	MW12	27/06/2017	2.22	388.6	5.47	250.3	16.2
MW16_27 Jun 17_-	MW16	MW16	27/06/2017	1.6	509	6.27	179.1	16.2
Statistical Summary								
Number of Results				6	6	6	6	6
Number of Detects				6	6	6	6	6
Minimum Concentration				0.09	150.5	5.47	163.2	16.1
Minimum Detect				0.09	150.5	5.47	163.2	16.1
Maximum Concentration				3.04	2789	7.04	250.3	19.1
Maximum Detect				3.04	2789	7.04	250.3	19.1
Average Concentration				1.4	1356	6.2	184	17
Median Concentration				1.17	1116.5	6.215	171.5	16.2
Standard Deviation				1.1	1165	0.5	33	1.2
Number of Guideline Exceedances				0	5	5	0	0
Number of Guideline Exceedances(Detects Only)				0	5	5	0	0

Env Stds Comments

#1:While extreme ph values (<4 and >11) may adversely affect health.

#2: #2: EC value divided by 0.67 from TDS criterion value.

				Metals								BTEX & MAH						TRH - NEPM 2013						TPH - NEPM 1999					PAH
				Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	C6 - C10 less BTEX (F1)	C6 - C10 Fraction	>C10 - C16 less Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total) - Lab calc	Naphthalene
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L
EQL				0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005	1	1	1	1	2	3	0.02	0.02	0.05	0.05	0.1	0.1	0.02	0.05	0.1	0.1	0.1	10
ADWG 2011 Aesthetic							1[#2]				3[#3]		25[#4]	3[#5]			20[#6]												
ADWG 2011 Health				0.01	0.002		2	0.01	0.001	0.02		1	800	300			600												
ANZECC 2000 - Stock Watering				0.5	0.01	1	0.5[#7]	0.1	0.002	1	20																		
ANZECC 2000 FW 95%					0.0002	0.001[#8]	0.0014	0.0034	0.0006	0.011	0.008	950			350														16
Lowland rivers (ANZECC 2000)																													
SampleCode	**Field_ID**	**LocCode**	**Sampled_Date-Time**																										
S17-Jn31070	MW04	MW04	27/06/2017	<0.001	<0.0002	<0.001	0.006	<0.001	<0.0001	0.001	0.009	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Jn31071	MW09	MW09	27/06/2017	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	0.005	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Jn31072	MW10	MW10	27/06/2017	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.002	0.018	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Jn31073	MW12	MW12	27/06/2017	<0.001	<0.0002	<0.001	0.002	<0.001	<0.0001	0.008	0.023	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	3.4	<0.1	<0.02	<0.05	3	0.3	3.3	<10
S17-Jn31074	MW16	MW16	27/06/2017	<0.001	<0.0002	<0.001	0.002	<0.001	<0.0001	0.002	0.009	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Jn31075	DUPL_01	MW16	27/06/2017	<0.001	<0.0002	<0.001	0.002	<0.001	<0.0001	0.002	0.009	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Jn31076	MW01	MW01	27/06/2017	0.004	<0.0002	<0.001	0.002	<0.001	<0.0001	<0.001	0.033	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
Statistical Summary																													
Number of Results				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects				1	0	0	5	0	0	5	7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0
Minimum Concentration				<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	0.005	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
Minimum Detect				0.004	ND	ND	0.002	ND	ND	0.001	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4	ND	ND	ND	3	0.3	3.3	ND
Maximum Concentration				0.004	<0.0002	<0.001	0.006	<0.001	<0.0001	0.008	0.033	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	3.4	<0.1	<0.02	<0.05	3	0.3	3.3	<10
Maximum Detect				0.004	ND	ND	0.006	ND	ND	0.008	0.033	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4	ND	ND	ND	3	0.3	3.3	ND
Average Concentration				0.001	0.0001	0.0005	0.0021	0.0005	0.00005	0.0023	0.015	0.5	0.5	0.5	0.5	1	1.5	0.01	0.01	0.025	0.025	0.53	0.05	0.01	0.025	0.47	0.086	0.51	5
Median Concentration				0.0005	0.0001	0.0005	0.002	0.0005	0.00005	0.002	0.009	0.5	0.5	0.5	0.5	1	1.5	0.01	0.01	0.025	0.025	0.05	0.05	0.01	0.025	0.05	0.05	0.05	5
Standard Deviation				0.0013	0	0	0.0018	0	0	0.0026	0.01	0	0	0	0	0	0	0	0	0	0	1.3	0	0	0	1.1	0.094	1.2	0
Number of Guideline Exceedances				0	0	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#2:from corrosion of pipes/fittings by salt, low ph water. taste threshold 3 mg/l. high concentrations colour water blue/green. >1 mg/l may stain fitings. >2 mg/l can cause ill effects in some people.
#3:usually from corrosion of galvanised pipes/fittings and brasses. natural concentrations generally <0.01 mg/l. taste problems >3 mg/l.
#4:occurs naturally in petrol and natural gas, forest-fire emissions.
#5:natural component of petrol and petroleum products.
#6:Could occur in drinking water as a pollutant, or from solvent used for bonding plastic fittings.
#7:Guideline value for sheep
#8:In absence of Total Cr guideline Cr(VI) guideline has been adopted

Appendix B
Table B3
Duplicate Summary Table Event 11

Field Duplicates (WATER)
Filter: SDG in('29 Jun 2017')

SDG	29-Jun-17	29-Jun-17	
Field ID	MW16	DUPL_01	**RPD**
Sampled Date/Time	27/06/2017	27/06/2017	

Chem_Group	ChemName	Units	EQL			
Metals	Arsenic (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Cadmium (Filtered)	mg/l	0.0002	<0.0002	<0.0002	0
	Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Copper (Filtered)	mg/l	0.001	0.002	0.002	0
	Lead (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Mercury (Filtered)	mg/l	0.0001	<0.0001	<0.0001	0
	Nickel (Filtered)	mg/l	0.001	0.002	0.002	0
	Zinc (Filtered)	mg/l	0.005	0.009	0.009	0
BTEX & MAH	Benzene	µg/l	1	<1.0	<1.0	0
	Toluene	µg/l	1	<1.0	<1.0	0
	Ethylbenzene	µg/l	1	<1.0	<1.0	0
	Xylene (o)	µg/l	1	<1.0	<1.0	0
	Xylene (m & p)	µg/l	2	<2.0	<2.0	0
	Xylene Total	µg/l	3	<3.0	<3.0	0
TRH - NEPM 2013	C6 - C10 less BTEX (F1)	mg/l	0.02	<0.02	<0.02	0
	C6 - C10 Fraction	mg/l	0.02	<0.02	<0.02	0
	>C10 - C16 less Naphthalene (F2)	mg/l	0.05	<0.05	<0.05	0
	>C10 - C16 Fraction	mg/l	0.05	<0.05	<0.05	0
	>C16 - C34 Fraction (F3)	mg/l	0.1	<0.1	<0.1	0
	>C34 - C40 Fraction (F4)	mg/l	0.1	<0.1	<0.1	0
TPH - NEPM 1999	C6 - C 9 Fraction	mg/l	0.02	<0.02	<0.02	0
	C10 - C14 Fraction	mg/l	0.05	<0.05	<0.05	0
	C15 - C28 Fraction	mg/l	0.1	<0.1	<0.1	0
	C29 - C36 Fraction	mg/l	0.1	<0.1	<0.1	0
	C10 - C36 (Sum of Total) - Lab calc	mg/l	0.1	<0.1	<0.1	0
PAH	Naphthalene	µg/l	10	<10.0	<10.0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Attachment C - Field Sheets and Calibration Certificates

Location	Depth (m)	Time
MW16	1.304	8.35am
MW13	8.350	9.15am
MW08	1.753	9.52am
MW03	16.963	11.52am

GROUNDWATER PURGING AND SAMPLIN 'G FIELD SHEET

PROJECT DETAILS	Borehole ID
Project Number: 21/24306	MW01
Project Name: Foxground to Berry Bypass	Sample ID: MW01
Client: Fulton Hogan	Date: 27/6/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.870	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 9.300	QA Collected:

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
10.49	1	2.940	7.39	2477	6.78	202.0	15.4	No odour, no sheen, clear
10.51	~~3~~	3.520	7.57	2514	6.98	193.6	16.4	" "
10.54	5	4.205	7.47	2508	7.08	187.1	16.4	" "
10.56	7	4.815	7.50	2488	7.12	183.1	16.3	" "
10.58	9	5.630	7.59	2486	7.14	179.2	16.0	" "
11.00	11	6.350	7.57	2491	7.15	176.4	16.1	" "
11.03	13	7.140	1.40	2768	7.08	173.4	16.0	(Pump moved down well ~8m)
11.05	14	7.690	0.43	2786	7.06	171.4	16.1	
11.08	16	8.530	0.09	2789	7.04	168.6	16.2	
Post Sample Parameters								

Number of Bottles:

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW04
Project Number: 21/24306	
Project Name: Foxground to Berry Bypass	Sample ID: MW04
Client: Fulton Hogan	Date: 27/6/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.418	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 1.610	QA Collected:

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
12:29	1	1.830	2.90	166.6	7.67	151.7	15.1	Grey turbid, no odour, no sheen (pump was 2/3 bottle
12:31	2	1.922	2.94	155.6	7.12	161.4	15.4	" "
12:33	4	2.200	3.44	150.0	6.68	167.6	15.5	Slightly turbid
12:35	6	2.425	5.04	150.3	6.56	169.0	15.7	" "
12:37	8	2.375	3.35	149.9	6.35	172.9	15.9	" "
12:39	9	2.502	2.15	150.3	6.22	174.5	16.0	" "
12:41	10	2.657	2.32	150.3	6.17	174.2	16.1	" "
12:43	11	2.755	3.04	150.5	6.13	174.4	16.1	" "
Post Sample Parameters								

Number of Bottles:

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID
Project Number: 21/24306	MW09
Project Name: Foxground to Berry Bypass	Sample ID: MW09
Client: Fulton Hogan	Date: 27/6/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 6.095	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 6.912	QA Collected: —

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
1.59	1	6.550	0.30	1698	6.29	167.3	16.9	no odour, no sheen, clear
2.02	3	6.795	~	1754	6.31	176.1	19.3	" "
2.04	4	6.865	—	1766	6.30	172.8	19.3	" "
2.07	6	6.865	—	1753	6.30	166.3	19.1	" "
2.09	7	6.863	0.32	1735	6.29	166.0	19.1	" "
2.11	8	6.860	0.53	1724	6.28	163.2	19.1	" "
Post Sample Parameters								

Number of Bottles: 4

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID
Project Number: 21/24306	MW10
Project Name: Foxground to Berry Bypass	Sample ID: MW12
Client: Fulton Hogan	Date: 27/6/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 10.645	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 10.685	QA Collected: →

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
2.41	1	10.705	1.50	2541	6.55	166.6	16.7	no odour, no sheen, slightly cloudy
2.43	2	10.695	—	2572	6.36	164.8	16.9	" "
2.45	3	10.700	—	2575	6.29	161.9	16.9	" "
2.47	5	10.707	0.09	2575	6.23	177.3	17.0	" "
2.49	6	10.719	0.26	2575	6.21	174.5	17.0	" "
2.52	8	10.730	0.55	2574	6.17	170.0	17.0	" "
2.55	9	10.720	0.74	2575	6.16	167.8	17.0	" "
Post Sample Parameters								

Number of Bottles:

Comments: Vacuum filter bailer used in-line filter. Well now only has stick-up of 0.01m. Excavation/ground levelling has occurred around well.

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW12
Project Number: 21/24306	
Project Name: Foxground to Berry Bypass	Sample ID: MW12
Client: Fulton Hogan	Date: 27/6
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 6.260	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 7.350	QA Collected: —

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
3.23	1	6.635	0.72	387.5	6.51	170.1	16.2	no odour, no sheen, very slightly cloudy.
3.26	3	7.085	0.93	388.4	5.92	188.6	16.4	" "
3.28	4	7.205	1.62	391.9	5.74	201.4	16.4	" "
3.30	5	7.260	2.15	392.0	5.66	213.6	16.3	" "
3.32	7	7.310	2.17	390.9	5.57	225.4	16.2	" "
3.35	8	7.310	2.21	389.7	5.51	240.9	16.2	" "
3.37	9	7.367	2.22	386.6	5.47	250.3	16.2	" "
Post Sample Parameters								

Number of Bottles:

Comments: Well was open. Cows have been in paddock. Well lid shut with string

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

GHD

PROJECT DETAILS	Borehole ID: MW16
Project Number: 21/24306	
Project Name: Foxground to Berry Bypass	Sample ID: MW16
Client: Fulton Hogan	Date: 27/6/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 1.304	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 1.716	QA Collected: DUPL1

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
0826	2.00	1.723	0.48	479.1	7.71	193.0	13.9	No odour, no sheen, clear.
0828	3.00	1.785	1.56	485.7	7.19	188.7	14.7	"
0830	4.00	1.765	2.56	489.8	6.97	188.4	15.0	"
0832	5.00	1.794	2.11	495.2	6.76	188.2	15.5	"
0834	6.00	1.785	1.80	498.5	6.59	187.6	15.7	"
0836	7.00	1.782	1.60	502	6.46	185.9	15.9	"
0838	8.00	1.760	1.53	506	6.39	183.5	15.0	"
0840	9.00	1.785	1.55	507	6.33	181.4	16.0	"
0842	10.00	1.795	1.60	509	6.27	179.1	16.2	"
Post Sample Parameters								

Number of Bottles: 8

Comments: Duplicate 1. Cubbitt [illegible] works occurring [illegible] South.

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

AirMet Scientific P/L
7-11 Ceylon Street
Nunawading
Victoria 3131, Australia

Calibration Certificate

This document hereby certifies that this instrument detailed has been calibrated to the parameters listed below.

Certificate Print Date: 23 June, 2017
Calibration Date: 23 June, 2017
Next Calibration Due: 23 December, 2017

Call ID: **00199924**
Job / SO Number:

Customer: GHD Pty Ltd
Type: Water Meter
Model: WATERMETER
Serial No: 13J100151
Description: YSI Pro Plus Water Quality Meter

Sensor	Serial No	Standard Solutions	Certified	Solution # (Bottle #)	Instrument Reading	Units
Dissolved Oxygen		0 ppm		4347	0.03	ppm
Dissolved Oxygen		747.9mmHg		Air	8.74	ppm
EC		2.76 ms/cm		290786	2.76	ms/cm
Ph		pH 7.0		288773	6.82	pH
Ph		pH 4.0		288994	3.95	pH
Redox		229.1 mV		OB1388/OB1390	229.1	mV
Temp		22.3°C		MultiTherm	21.7	°C

Completed by: *Shaun Stephens* **Signed:**

Australian Standard Alarm Levels ☐

Attachment D - Laboratory Certificates

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 18217

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**GHD Pty Ltd NSW**
Contact name:	Stefan Charteris
Project name:	FOXGROUND TO BERRY BYPASS
Project ID:	2124306/01
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Jun 29, 2017 10:00 AM
Eurofins | mgt reference:	**552210**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 2.5 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Stefan Charteris - stefan.charteris@ghd.com.

eurofins | mgt

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
2-5 Kingston Town Close
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NATA # 1261
Site # 1254 & 14271

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 18217

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: FOXGROUND TO BERRY BYPASS
Project ID: 2124306/01

Order No.:
Report #: 552210
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Jun 29, 2017 10:00 AM
Due: Jul 6, 2017
Priority: 5 Day
Contact Name: Stefan Charteris

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Metals M8 filtered	BTEX	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 18217								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	MW04	Jun 27, 2017		Water	S17-Jn31070	X	X	X
2	MW09	Jun 27, 2017		Water	S17-Jn31071	X	X	X
3	MW10	Jun 27, 2017		Water	S17-Jn31072	X	X	X
4	MW12	Jun 27, 2017		Water	S17-Jn31073	X	X	X
5	MW16	Jun 27, 2017		Water	S17-Jn31074	X	X	X
6	DUPL_01	Jun 27, 2017		Water	S17-Jn31075	X	X	X
7	MW01	Jun 27, 2017		Water	S17-Jn31076	X	X	X
Test Counts						7	7	7

eurofins | mgt

Certificate of Analysis

GHD Pty Ltd NSW
Level 15, 133 Castlereagh Street
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Stefan Charteris**

Report **552210-W**
Project name FOXGROUND TO BERRY BYPASS
Project ID 2124306/01
Received Date Jun 29, 2017

Client Sample ID			**MW04**	**MW09**	**MW10**	**MW12**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S17-Jn31070**	**S17-Jn31071**	**S17-Jn31072**	**S17-Jn31073**
Date Sampled			**Jun 27, 2017**	**Jun 27, 2017**	**Jun 27, 2017**	**Jun 27, 2017**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	3.0
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	0.3
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	3.3
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	88	94	94	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	3.4
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.006	< 0.001	< 0.001	0.002
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.001	< 0.001	0.002	0.008
Zinc (filtered)	0.005	mg/L	0.009	0.005	0.018	0.023

Client Sample ID			MW16	DUPL_01	MW01
Sample Matrix			Water	Water	Water
Eurofins | mgt Sample No.			S17-Jn31074	S17-Jn31075	S17-Jn31076
Date Sampled			Jun 27, 2017	Jun 27, 2017	Jun 27, 2017
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	86	93	92
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1
Heavy Metals					
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	0.004
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.002	0.002	0.002
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.002	0.002	< 0.001
Zinc (filtered)	0.005	mg/L	0.009	0.009	0.033

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Jul 05, 2017	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jun 29, 2017	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Jul 05, 2017	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX	Sydney	Jun 29, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Metals M8 filtered	Sydney	Jun 29, 2017	28 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

eurofins | mgt

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Site # 1254 & 14271

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NATA # 1261 Site # 18217

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Murarrie QLD 4172
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NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 18217

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: FOXGROUND TO BERRY BYPASS
Project ID: 2124306/01

Order No.:
Report #: 552210
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Jun 29, 2017 10:00 AM
Due: Jul 6, 2017
Priority: 5 Day
Contact Name: Stefan Charteris

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Metals M8 filtered	BTEX	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 18217								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	MW04	Jun 27, 2017		Water	S17-Jn31070	X	X	X
2	MW09	Jun 27, 2017		Water	S17-Jn31071	X	X	X
3	MW10	Jun 27, 2017		Water	S17-Jn31072	X	X	X
4	MW12	Jun 27, 2017		Water	S17-Jn31073	X	X	X
5	MW16	Jun 27, 2017		Water	S17-Jn31074	X	X	X
6	DUPL_01	Jun 27, 2017		Water	S17-Jn31075	X	X	X
7	MW01	Jun 27, 2017		Water	S17-Jn31076	X	X	X
Test Counts						7	7	7

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	111			70-130	Pass	
TRH C10-C14	%	100			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	96			70-130	Pass	
Toluene	%	95			70-130	Pass	
Ethylbenzene	%	90			70-130	Pass	
m&p-Xylenes	%	87			70-130	Pass	
o-Xylene	%	92			70-130	Pass	
Xylenes - Total	%	89			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	89			70-130	Pass	
TRH C6-C10	%	98			70-130	Pass	
TRH >C10-C16	%	107			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S17-Jn31071	CP	%	66			70-130	Fail	Q08
Spike - % Recovery									
BTEX				Result 1					
Benzene	S17-Jn31071	CP	%	94			70-130	Pass	
Toluene	S17-Jn31071	CP	%	89			70-130	Pass	
Ethylbenzene	S17-Jn31071	CP	%	88			70-130	Pass	
m&p-Xylenes	S17-Jn31071	CP	%	88			70-130	Pass	
o-Xylene	S17-Jn31071	CP	%	90			70-130	Pass	
Xylenes - Total	S17-Jn31071	CP	%	89			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S17-Jn31071	CP	%	93			70-130	Pass	
TRH C6-C10	S17-Jn31071	CP	%	64			70-130	Fail	Q08
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S17-Jn32397	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S17-Jn32397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S17-Jn32397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S17-Jn32397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S17-Jn32397	NCP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S17-Jn32397	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S17-Jn32397	NCP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S17-Jn32397	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S17-Jn32397	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Nibha Vaidya Analytical Services Manager

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CHAIN OF CUSTODY RECORD

ABN 50 005 085 521

552210

Sydney Laboratory: Unit F3 Bld F 16 Mars Rd, Lane Cove West, NSW 2066 | 02 9900 8400 | EnviroSampleNSW@eurofins.com

Brisbane Laboratory: Unit 1, 21 Smallwood Pl, Murarrie, QLD 4172 | 07 3902 4600 | EnviroSampleQLD@eurofins.com

Perth Laboratory: Unit 2, 91 Leach Highway, Kewdale WA 6105 | 08 9251 9600 | EnviroSampleWA@eurofins.com

Melbourne Laboratory: 2 Kingston Town Close, Oakleigh, VIC 3166 | 03 8564 5000 | EnviroSampleVic@eurofins.com

Company	GHD Pty Ltd	Project №	2124306/01
Address	2/57 Graham Street, Nowra 2541 NSW	Project Name	Foxground to Berry Bypass
Contact Name	Jane Curran	Project Manager	Stefan Charteris
Phone №	(02) 4424 4960	Report Format	
Special Direction		Relinquished by	Jane Curran
Purchase Order			3 pm 28 / 06 / 17
Quote ID №	150501GHD	Email for Results	jane.curran@ghd.com, stefan.charteris@ghd.com, nicole.rosen@ghd.com

Analysis (Note: Where metals are requested, please specify Total or Filtered)

№	Client Sample ID	Date	Matrix	M8 (Heavy Metals)	TPH	BTEX	Containers: 1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL Vial	125mL Amber Glass	Jar	1L amber	Other ( )	Turn Around Requirements / Sample Comments / DG Hazard Warning
1	MW04	27/06/17	w	X	X	X		1			2			1		Metals have been field filtered
2	MW09	27/06/17	w	X	X	X		1			2			1		
3	MW10	27/06/17	w	X	X	X		1			2			1		
4	MW12	27/06/17	w	X	X	X		1			2			1		
5	MW16	27/06/17	w	X	X	X		1			2			1		
6	DUPL_01	27/06/17	w	X	X	X		1			2			1		
7	MW01	27/06/17	w	X	X	X		1			2			1		
8																
9																
10																
	Total Counts			7				7			7			7		

Turn Around Requirements: Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☑ 5 Day ☐ Other ( ) * Surcharges apply

Method of Shipment	☑ Courier (#)	☐ Hand Delivered	☐ Postal	Name	Jane Curran	Signature		Date	28 / 06 / 17	Time	3 : 00
Laboratory Use Only	Received By	Rupam	SYD | BNE | MEL | PER | ADL | NEW | DAR	Signature	Rupam	Date	29.06.17	Time	10 : 00 AM	Temperature	9.5°C
	Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Signature		Date	___/___/___	Time	___:___	Report №	

Attachment E - Laboratory Quality Assurance and Quality Control Results

Field Program Groundwater

An Intra-laboratory duplicate sample was collected and analysed as part of the groundwater sampling program and the relative percentage differences (RPD) were calculated. Intra-laboratory measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the original sample
Cd = Analyte concentration of the duplicate sample

GHD adopts a nominal acceptance criterion of 30% RPD for field duplicates and splits for inorganics and a nominal acceptance criterion of 50% RPD for field duplicates and splits for organics, however it is noted that this may not always be achieved, or at low analyte concentrations. Groundwater QA/QC results are presented in Table B3, Attachment B. There were no discrepancies in GHD's adopted criterion for RPDs calculated for the intra laboratory duplicate pairs for the analytes tested.

Laboratory Program

The NATA certified laboratory utilised for this assessment (i.e. Eurofins | Mgt) undertook their own quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are provided as Attachment D. In summary:

- All samples were noted to be correctly preserved.
- Samples were extracted within allocated holding times.

Method blank results were less than the Practical Quantitative Level (PQL), and surrogate spike and laboratory control sample recoveries were within laboratory acceptance criteria for majority of the samples collected over the event.

As part of NATA certification laboratories must run a quality assurance (QA) analysis on one matrix spike within 20 samples. To do this, the laboratory determines spike recovery in a Laboratory Control Sample (LCS), a Non-Client Parent (NCP) quality control sample and a Client Parent (CP) quality control and compare them against each other. Spike recoveries from these samples indicate if the laboratory equipment, namely the chromatography, is working correctly and has no background noise. Spike sample recovery for CP sample MW09 had recovery results just below the recommended acceptance criteria of 70-130%, including 66% for TRH C6-C9 and 64% for TRH C6-C10. A low spike recovery in CP may be a result of background noise in the chromatography potentially caused from excessive amounts of sediment in the sample and/or a high number of other contaminants within the sample. Both the LCS and NCP samples had recovery within the recommended acceptance criteria.

Summary of Quality Assurance / Quality Control Results

Laboratory results for MW09 for TRH were below detection limits. The CP spike recovery results may suggest TRH in this sample in reality could be higher than what has been recorded. A higher value for TRH in MW09 is unlikely because the spike recovery for the sample was very close to the recommended limit of 70-130%.

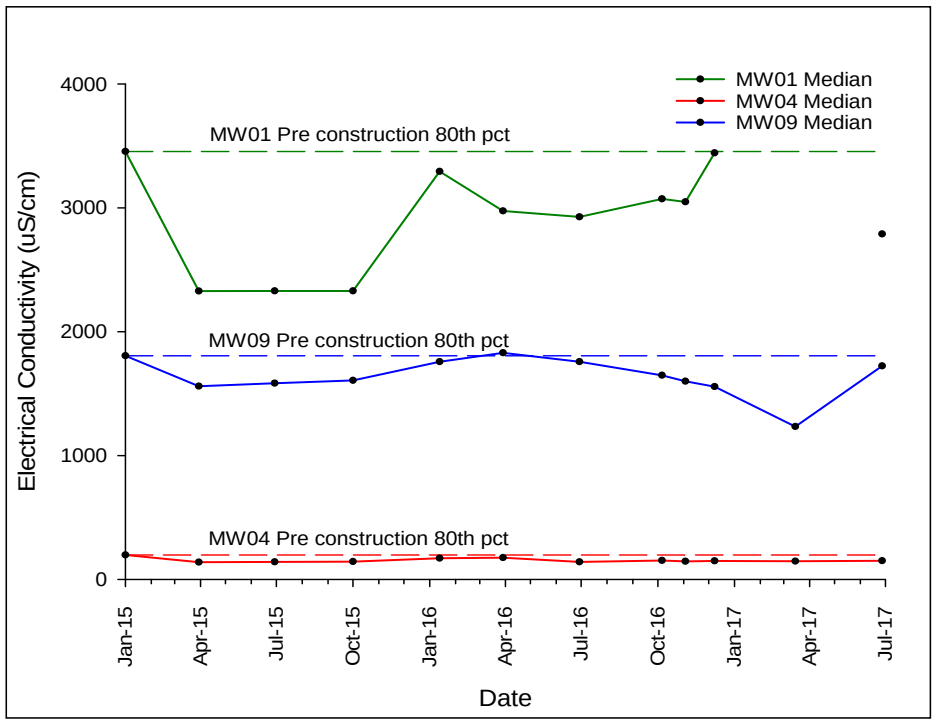
In addition, TRH exceedances were only detected in the MW12 sample. A CP spike recovery analysis was not carried out upon this sample therefore it is unknown if background noise was present within the chromatography to have impacted laboratory results. RPD results indicate correct sampling procedures were carried out for Event 11 therefore the data is considered valid and of sufficient quality to meet the data quality objectives for the assessment.

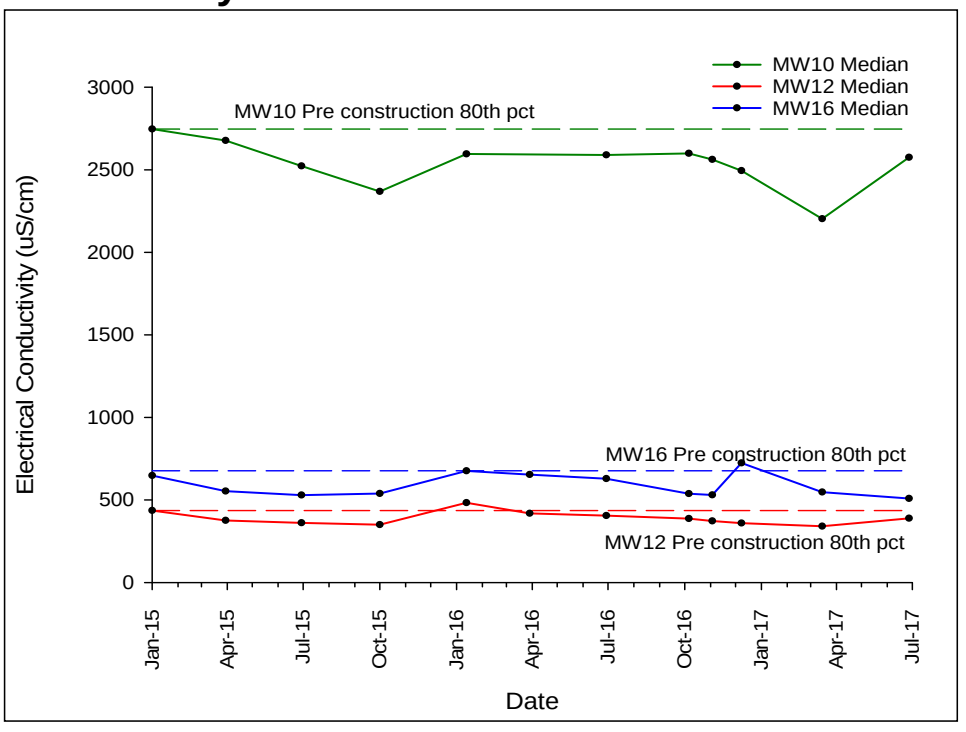
Attachment F - Control Charts and Result Graphs

Control Charts: Electrical Conductivity, pH

Result Graphs: Nickel, Copper, Arsenic, Zinc

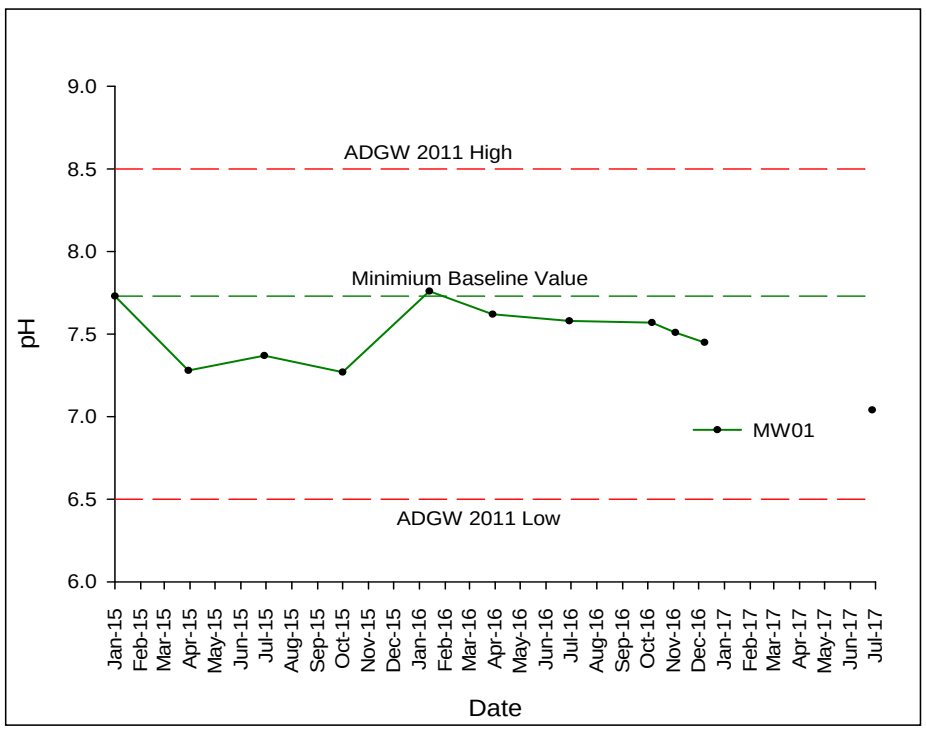
Electrical Conductivity



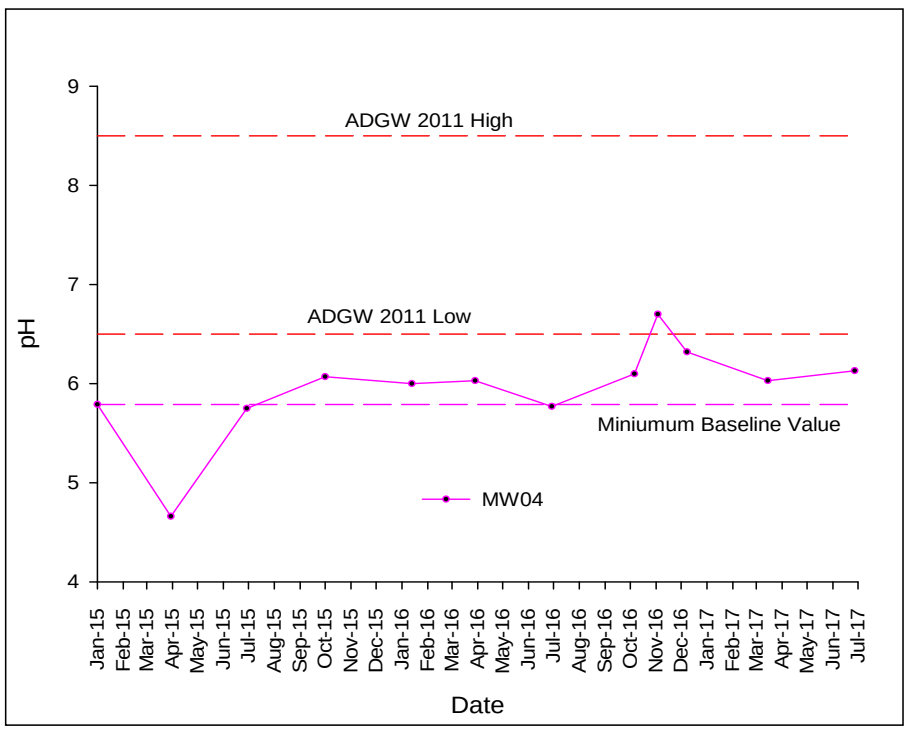


pH

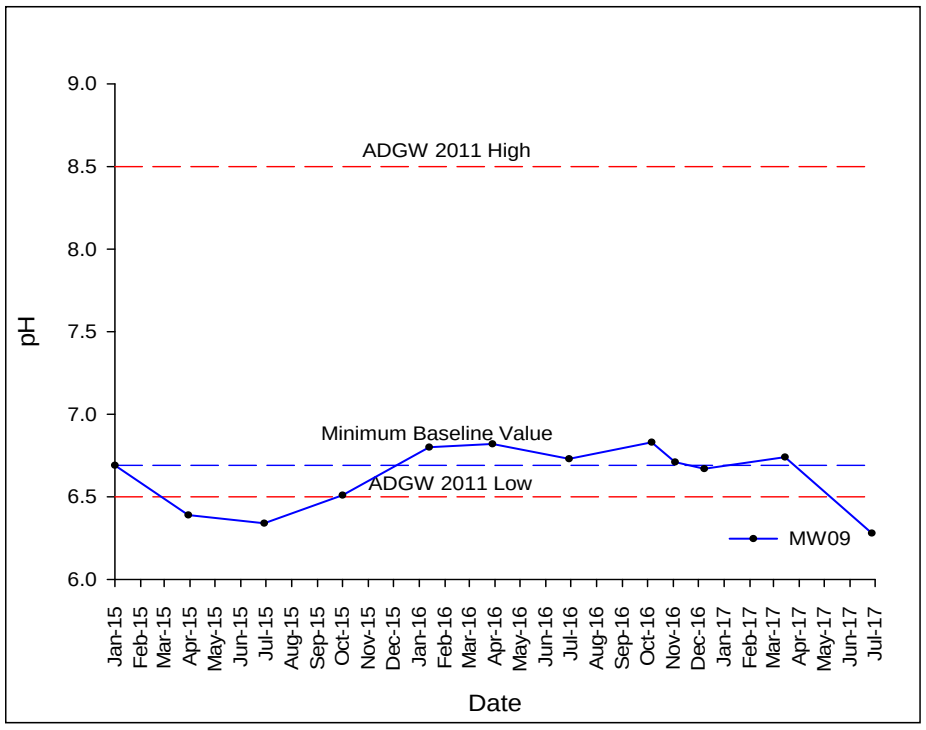
MW01



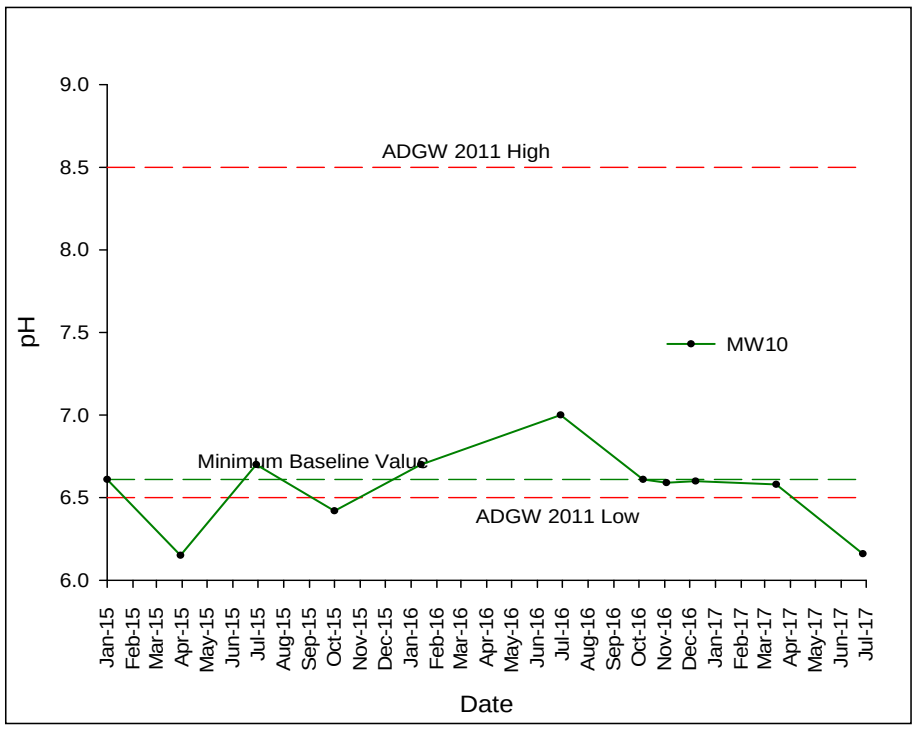
MW04



MW09

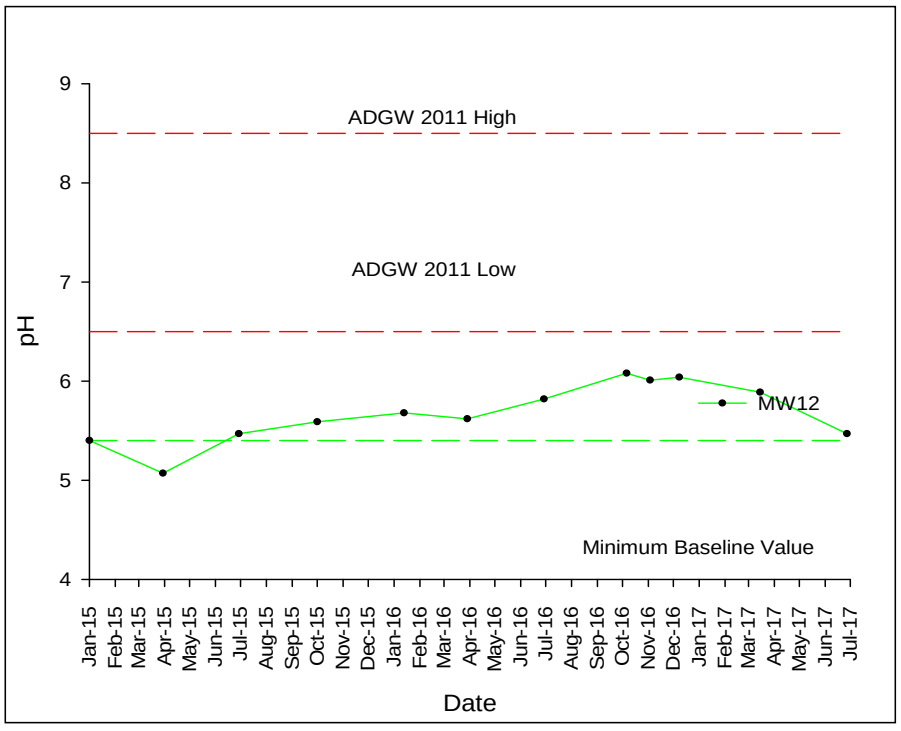


MW10

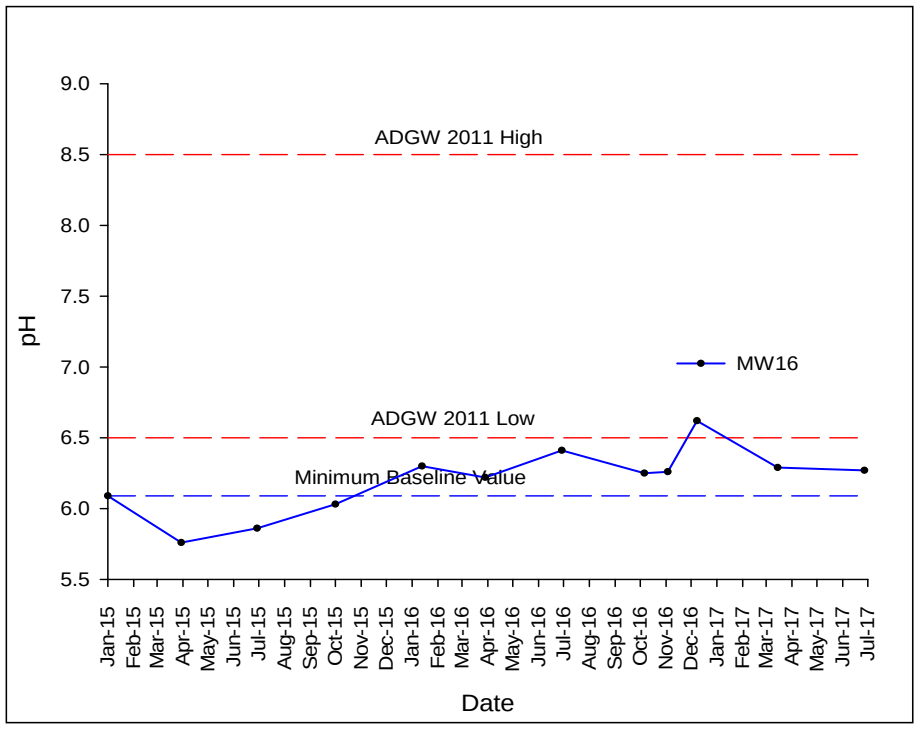


Attachment F
Control Charts

MW12

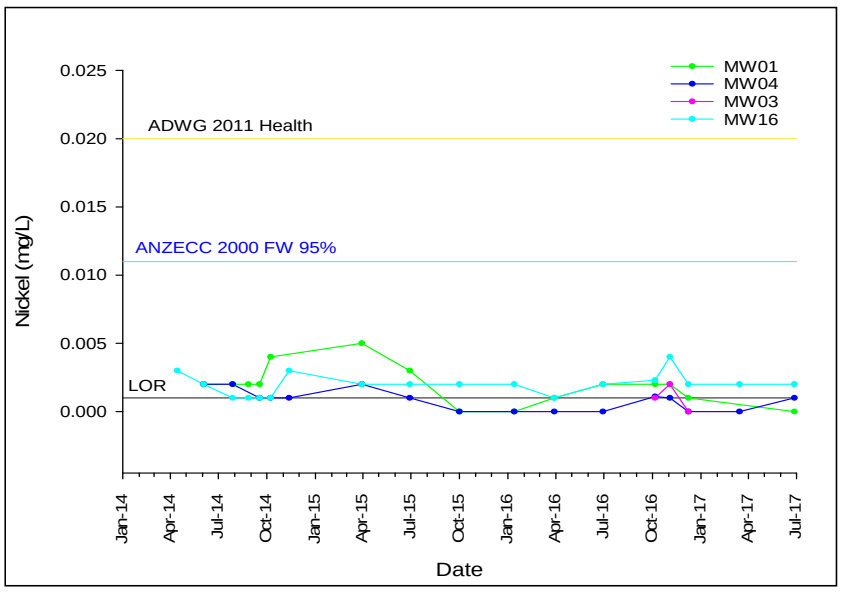


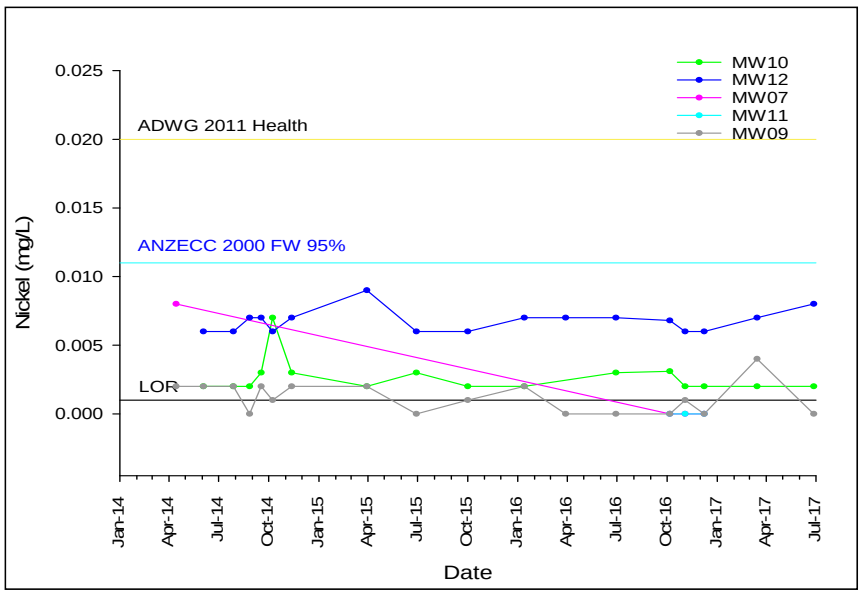
MW16



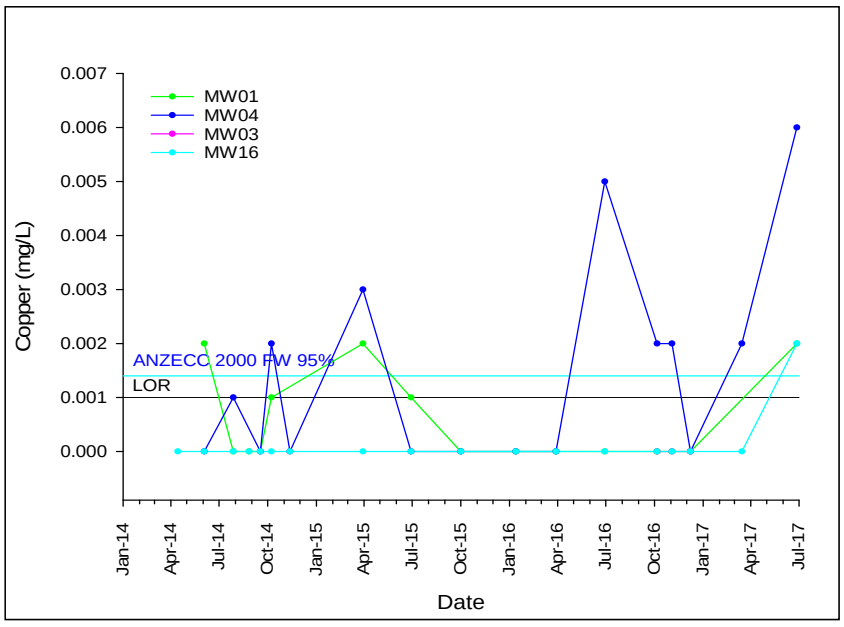
Attachment F
Control Charts

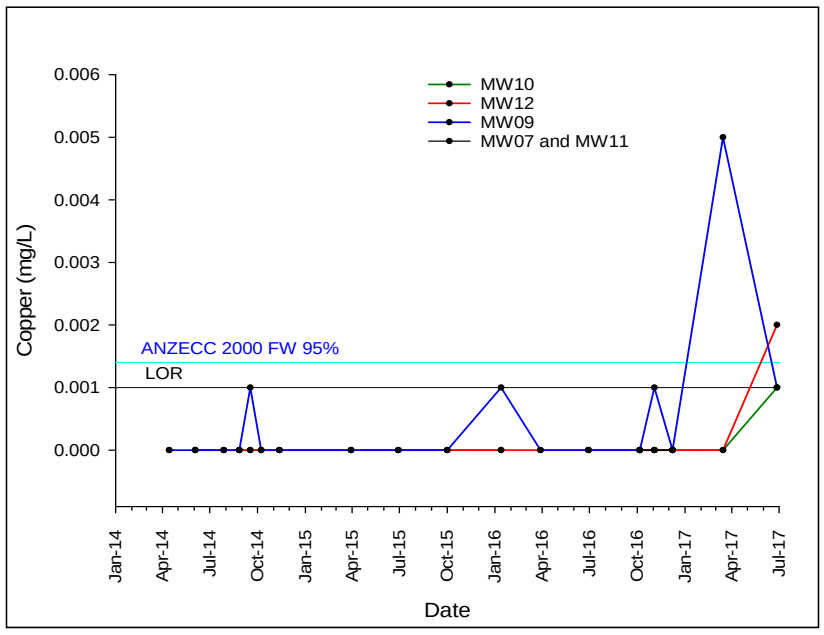
Nickel



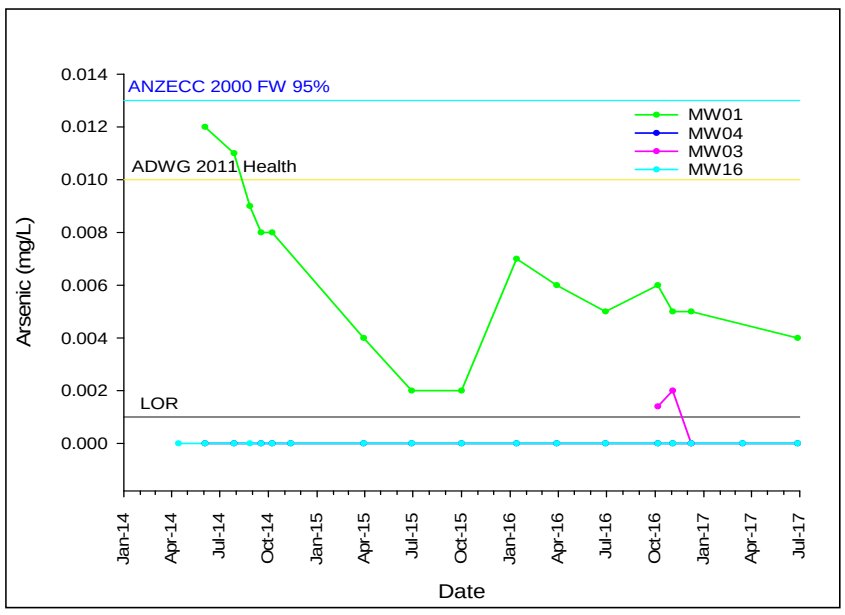


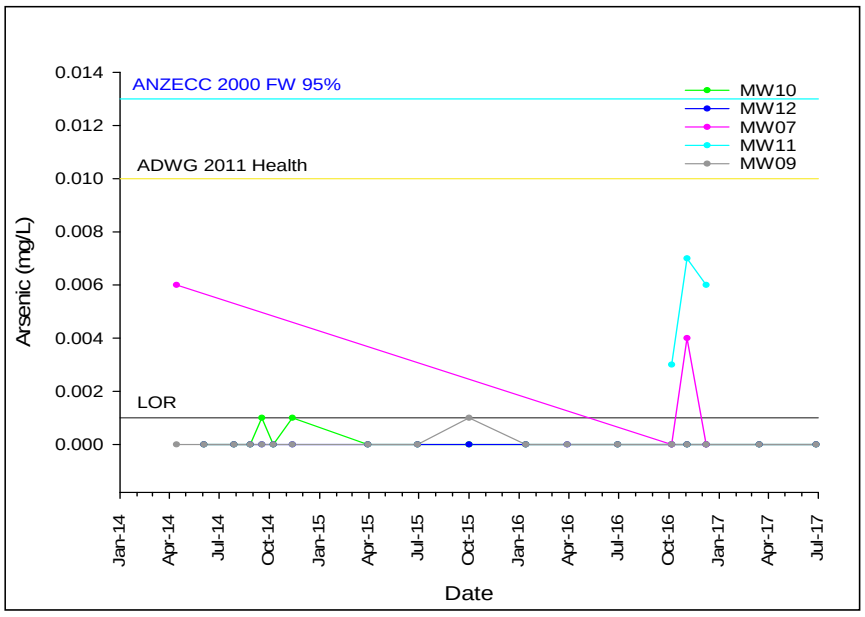
Copper





Arsenic





Zinc

18 October 2017

Jacob Cooper
Environmental Coordinator
Fulton Hogan Construction Pty Ltd
P.O. Box 353
Berry NSW 2535

Our ref: 21/24306
220826

Dear Jacob,

Groundwater Monitoring Event
Construction Event 12

1 Scope and limitations

In accordance with the Princes Highway upgrade for Foxground and Berry Bypass (FBB) - Water Monitoring Project Brief (*Contract No. 12.2574.3019*), GHD Pty Ltd (GHD) completed a quarterly round of groundwater quality monitoring at locations adjacent to current works at the site.

GHD was able to monitor six wells at locations MW01, MW04, MW09, MW10, MW12 and MW16. This sampling event did not include the up-gradient monitoring well locations, which were monitored on a temporary basis during Events 8 and 9 as part of an additional scope of work.

Groundwater elevations have also been monitored using groundwater pressure loggers at MW03, MW08, MW13 and MW16. A barometric pressure gauge installed at the Fulton Hogan compound located on Woodhill Mountain Road, Berry has been used to filter barometric effects from the data.

This letter report documents the findings of the twelfth groundwater monitoring event (Event 12) undertaken since the commencement of construction. The twelfth event is the final quarterly monitoring event undertaken by GHD due to Fulton Hogan having completed the construction phase of works.

At the time of monitoring it was observed that the primary construction works were complete, other than some road re-surfacing works and that the new road was operational.

2 Field and Analytical Program

The groundwater sampling was undertaken at the six nominated groundwater monitoring wells on 27 September 2017; refer to Figure 1, Attachment A, depicting the monitoring well locations. This quarterly groundwater sampling event was conducted in accordance with the sampling program and protocols provided in the following documents:

- GHD 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Water Quality Monitoring Groundwater Monitoring Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

Groundwater field parameters were measured during sampling including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO) and reduction-oxidation potential (redox). The readings are summarised in Table B1, Attachment B. GHD's detailed field record sheets and calibration certificates are provided in Attachment C and indicate suitable calibration of the water quality meter prior to use. Water quality parameters were recorded using Fulton Hogan's Horiba water quality meter calibrated by Fulton Hogan personnel on the 25th September 2017.

Water samples were submitted to a National Association of Testing Authorities (NATA) certified testing laboratory (Eurofins | Mgt) with the following analysis undertaken:

- Total Petroleum Hydrocarbons (TPH) NEPM 1999 and Total Recoverable Hydrocarbons (TRH) NEPM 2013.
- Benzene, Toluene, Ethyl-benzene, Xylene and Naphthalene (BTEXN).
- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn) dissolved.

Each sample was field filtered prior to laboratory analysis for heavy metals.

One duplicate sample was collected (labelled DUPL01), from well MW09.

3 Results and Discussion

This section presents control charts and discusses results (with regard to exceedances of criteria or inconsistencies in the groundwater results for Event 12) in accordance with the following:

- GHD's letter report limitations provided in Section 4.
- GHD 2014, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

3.1 Groundwater Elevations

The rainfall within Broughton Creek catchment and the groundwater elevations within monitored wells are presented in Figure 2, Attachment A. The rainfall data was obtained from the NSW Office of Water website (http://realtimedata.water.nsw.gov.au/water.stm).

The recorded groundwater levels indicate the majority of wells are relatively stable. Previously groundwater elevations at MW01 had stabilised since construction began at a higher elevation however recent gauging indicates a general decrease in water elevation. A decrease in groundwater elevation is an expected response to final construction and ongoing operation activities near to MW01. A clear longer-term construction response in groundwater elevations is not evident in MW04, MW10, MW12 and MW16. There was a decrease in groundwater elevation at MW09 between Event 5 (March 2016) to Event 6 (June 2016), however elevations have remained relatively stable since.

The manually recorded groundwater elevations for all wells monitored, including those with data loggers installed are presented in Table 1 below.

Table 1 Manual groundwater observations for monitoring Event 12

Well ID	Well Depth (m)	Well Elevation (m AHD)	Groundwater Elevation (m btoc)	Groundwater Elevation (m AHD)
MW01	22.880	51.99	8.080	43.91
MW03	21.800	102.93	17.07	85.86
MW04	7.572	80.01	2.633	77.38
MW07	30.000	58.61	-	-
MW08	9.875	28.59	3.045	25.55
MW09	10.050	32.34	6.726	25.61
MW10	14.840	32.30	11.435	20.87
MW11	36.100	60.09	-	-
MW12	10.665	24.39	7.190	17.20
MW13	14.800	49.94	9.560	40.38
MW16	10.755	22.82	2.230	20.59

Notes:
m btoc = metres below top of casing
m AHD = metres above Australian height datum

3.2 Groundwater Quality Sampling Results

There were no visual or olfactory signs of contamination observed at any of the sampling points during the groundwater investigation. Groundwater was generally observed to be clear to cloudy (grey or brown) or turbid grey.

In situ water quality parameters measured during sampling are presented in Table B1, Attachment B.

Groundwater laboratory analytical results for the suite listed in Section 2 are tabulated against selected criteria (in accordance with the protocols detailed in Section 2) in Table B2, Attachment B. Laboratory documents are provided in Attachment D.

Groundwater quality parameters and chemical concentrations outside of the ranges present within the screening criteria are summarised in Table 2. The findings suggest groundwater quality is above the screening criteria at locations throughout the catchment for pH, electrical conductivity, copper, chromium and zinc. All monitoring locations exceeded the adopted ecological freshwater screening criteria for zinc except for location MW04. MW04 exceeded the adopted ecological freshwater screening criteria for Chromium and Copper. No locations exceeded the adopted ecological freshwater criteria for arsenic, cadmium, lead, mercury or nickel. All locations' metals concentrations were also below selected drinking water criteria. Several of the electrical conductivity and the pH results were outside of the aesthetic criteria listed in the Australian Drinking Water Guidelines (ADWG, 2011) and lowland rivers (ANZECC, 2000) criteria indicating the groundwater is not suitable from an aesthetic drinking water perspective. All results are below the ANZECC stock watering criteria indicating suitability for this purpose.

Table 2 Summary of Water Quality Screening

Analyte	Units	Screening Criteria	No. Locations Exceeding Adopted Criteria	Minimum value	Maximum value
pH (field)	pH units	6.5 - 8.5 (ADWG Aesthetic) and 6.5 – 8.0 (Lowland Rivers ANZECC 2000)	2	6.32 (MW12)	8.27 (MW01)
Electrical Conductivity (field)	us/cm	890 (ADWG Aesthetic) and 300 (Lowland Rivers ANZECC 2000)	3 (ADWG) 5 (Lowland Rivers)	437 (MW12)	3450 (MW01)
Zinc dissolved (laboratory)	mg/L	0.008 (ANZECC 2000 Freshwater 95%)	5+ QA sample	0.017 (MW01)	0.029 (MW09)
Copper dissolved (laboratory)	mg/L	0.0014 (ANZECC 2000 Freshwater 95%)	1		0.002 (MW04)
Chromium III + VI (laboratory)	mg/L	0.001 (ANZECC 2000 FW 95%)	1		0.002 (MW04)

The majority of the exceedances of criteria were also reported during the pre-construction phase of monitoring. Additional discussion of the results with regard to pre-construction data is provided in Sections 3.2.1 and 3.2.2.

An assessment of the field quality control sampling is provided in Table B3. No unacceptable difference in the primary (MW09) and duplicate sample (DUPL01) analysed were found.

A discussion of the field and laboratory quality assurance and quality control findings is provided in Attachment E.

3.2.1 Control Charts

In accordance with the assessment criteria documented in the monitoring plans and summarised in Section 2, control charts have been developed for specific analytes and are presented in Attachment F. These control charts are discussed further below.

Electrical Conductivity (field)

The groundwater control charts compare pre-construction (reference) data with construction and operation (test) data. The 'reference' data is presented as an 80th percentile of the pre-construction monitoring, while the 'test' data represent the median of the construction sampling. The control charts for Event 12 are presented in Attachment F.

The electrical conductivity control chart has an upper threshold 80th percentile limit. Location MW09 had a slight increase in electrical conductivity since Event 11, returning to a value previously seen approximately one year ago, slightly above the pre-construction 80th percentile. MW04 continues to have a stable electrical conductivity below the pre-construction 80th percentile. Location MW01 had an increase in electrical conductivity to a value seen almost one year ago, returning to a value equal to the pre-construction 80th percentile. Well MW10 increased above the pre-construction 80th percentile to it's highest value seen since construction began. MW16 remains below the 80th percentile with values

similar to those observed in the majority of previous monitoring events. MW12 has increased in electrical conductivity again since event 11 with a value in event 12 equal to the pre-construction 80th percentile.

There is generally consistent trends in the electrical conductivity across all wells suggesting that all results are indicative of prevailing climatic conditions rather than due to specific construction related impacts.

pH (field)

The pH control charts vary from the method used for electrical conductivity because there is a criteria range for assessing pH water quality as opposed to an upper threshold value. This limits the value of comparing pH changes to an 80th percentile baseline value in the control chart. As such, the actual data has been compared against the Australian Drinking Water Guidelines (ADWG 2011) of 6.5 – 8.5 pH units for drinking water and the lowest pH baseline value for each well recorded before construction (baseline data). It is noted that the ecological values for lowland rivers in south east Australia range between pH units of 6.5 and 8.0. This method also allows characterisation of the pH relative to the baseline (pre-construction) data and the adopted screening criteria.

The control chart for MW01 has increased since the last monitoring event to the highest value seen since construction began and is above the minimum baseline value (pre-construction). The pH recorded was above the ecological value for lowland rivers in south east Australia but remains below the Australian drinking water guidelines.

The pH level in MW04 increased again in event 12 with a value above the ADWG (2011) and above the minimum baseline value.

The pH in MW09 increased to the highest value observed since the beginning of construction, although is now within the drinking water guidelines. MW09 is above the minimum baseline value. The pH in MW10 increased from the last monitoring event to its highest value recorded since construction. The pH is now within the drinking water guidelines and above the minimum baseline value.

MW12 results are outside of ADWG (2011) screening criteria and MW16 is now within the screening criteria. Both MW12 and MW16 remain above the minimum baseline values reported before construction. MW12 appears to have a trend in pH values below the screening criteria.

The remaining analytes with detectable concentrations have been assessed using other methods and are discussed in the following sections.

3.2.2 Results Graphs

The concentrations for dissolved heavy metals (with detectable concentrations) were plotted in time series to assess the changes pre- and during construction and identify any emergence of trends. Control charts were considered unsuitable in this instance as the metals data generally have a high percentage of values below detection limits. This resulted in identified exceedances in the control charts that were associated with statistical issues rather than trends in the data. Time series graphs of the results were created for the following metals (which had detectable concentrations):

- Nickel.
- Copper.
- Arsenic.
- Zinc.

The results graphs for Event 12 are presented in Attachment F and are summarised below.

Nickel and Arsenic

The results graphs for nickel and arsenic are below the selected human health and ecological criteria. Further to this, with the inclusion of the latest results, there does not appear to be any increasing trends. Concentrations of nickel in MW01 and MW09 have increased slightly for this event but remain at relatively low concentrations.

Copper

The copper results graphs for wells MW16, MW12 and MW10 are below the limit of reporting (LOR) of 0.001 mg/L and below the adopted freshwater guidelines (ANZECC 2000).

The copper concentration in MW09 remains at limit of reporting (LOR) levels after a spike in concentration in event 10. The value in event 10 appears to be an anomalous result and not part of an emerging trend. Copper concentrations reported in MW04 and MW01 have returned to lower levels and may suggest the last event (Event 11) was an anomaly and not part of an emerging trend.

Zinc

All wells monitored during Event 11, other than MW04, have zinc concentrations above the selected ANZECC (2000) freshwater aquatic ecosystem criteria for the protections of aquatic ecosystems (there is no human health value for zinc) and elevated concentrations relative to pre-construction conditions (pre-December 2014).

MW16 has increased in zinc concentrations to levels last seen in event 7, which occurred almost a year ago. The concentration remains slightly elevated when compared with baseline (pre-construction). There is more variability in the data over the construction period.

MW04 has a lower zinc concentration relative to event 11, similar to the zinc concentration recorded during event 4. The concentration reported for event 12 is below the ANZECC (2000) criteria. There is more variability in the data over the construction period.

MW09 had increased zinc concentrations relative to event 11 but similar to values reported a year ago during event 8. The concentrations are above the selected ecological screening criteria and above concentrations observed during pre-construction. Results within MW09 have been more variable during construction than pre-construction.

MW10 has increased zinc concentrations relative to event 11 but similar to values reported a year ago during event 8. Zinc concentration continues to fluctuate above the selected criteria.

Zinc concentration at MW12 has had a slight decrease during this event, with Zinc concentrations continuing to fluctuate since construction began.

Overall the data sets indicate an increase in overall zinc concentration and variability, but any upward trends appear to have plateaued and/or have slightly declined through 2016 and 2017. Further sampling would clarify this trend.

Previous monitoring events that included monitoring of up and down gradient wells suggests that the increased concentrations and variability observed in down gradient wells since construction are associated with background variability rather than construction.

Chromium (III+VI)

Concentrations of Chromium (III+VI) have been detected in MW04 with a value of 0.002 mg/L which is slightly above the adopted freshwater criteria (ANZECC 2000). The only other time chromium was detected during construction across the site was during event 10 within well MW04, with a value of 0.002 mg/L. The results are below the stock watering guidelines. There are no human health guidelines for chromium.

TPH

TPH C_{15}-C_{36} identified in well MW12 in Event 11 was not detected during monitoring event 12. No TPH was detected in any of the monitoring locations for Event 12.

3.3 Recommendations

pH results for all locations are the highest since monitoring began, although are within the adopted ecological criteria for this event other than MW12 which has an upward pH trend toward the guideline range.

Chromium concentrations at MW04 should be evaluated during operation monitoring events to assess whether this result is an anomaly or background variation requiring further characterisation.

This is the final groundwater sampling event for construction activities. The next groundwater sampling event would be completed as part of post construction monitoring.

4 Limitations

This report has been prepared by GHD Pty Ltd (GHD) for Fulton Hogan and may only be used and relied on by Fulton Hogan for the purpose agreed between GHD and the Fulton Hogan as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Fulton Hogan arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Fulton Hogan and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Please contact the undersigned if you have any questions or require further information.

Kind Regards,

Jane Curran
Environmental Scientist
02 4424 4960

Stefan Charteris
Principal Hydrogeologist
02 9239 7472

Attachment A - Figures

Figure 1: Groundwater Sampling Locations

Figure 2: Rainfall vs Groundwater Elevation in Monitoring Wells (manual data)

Figure 3: Rainfall vs Electronic Groundwater Elevation (data logger data)

1:25,000 (at A3)

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Groundwater Sampling Locations
- Berry to Foxground upgrade alignment
- Roads
- Railways
- Waterways
- Lakes and dams

Roads and Maritime Services
Water Quality Monitoring

Job Number	61-24306
Revision	A
Date	11 Nov 2016

Groundwater Sampling Locations

Figure 1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Figure 2: Foxground to Berry Bypass Groundwater and Rainfall Observations

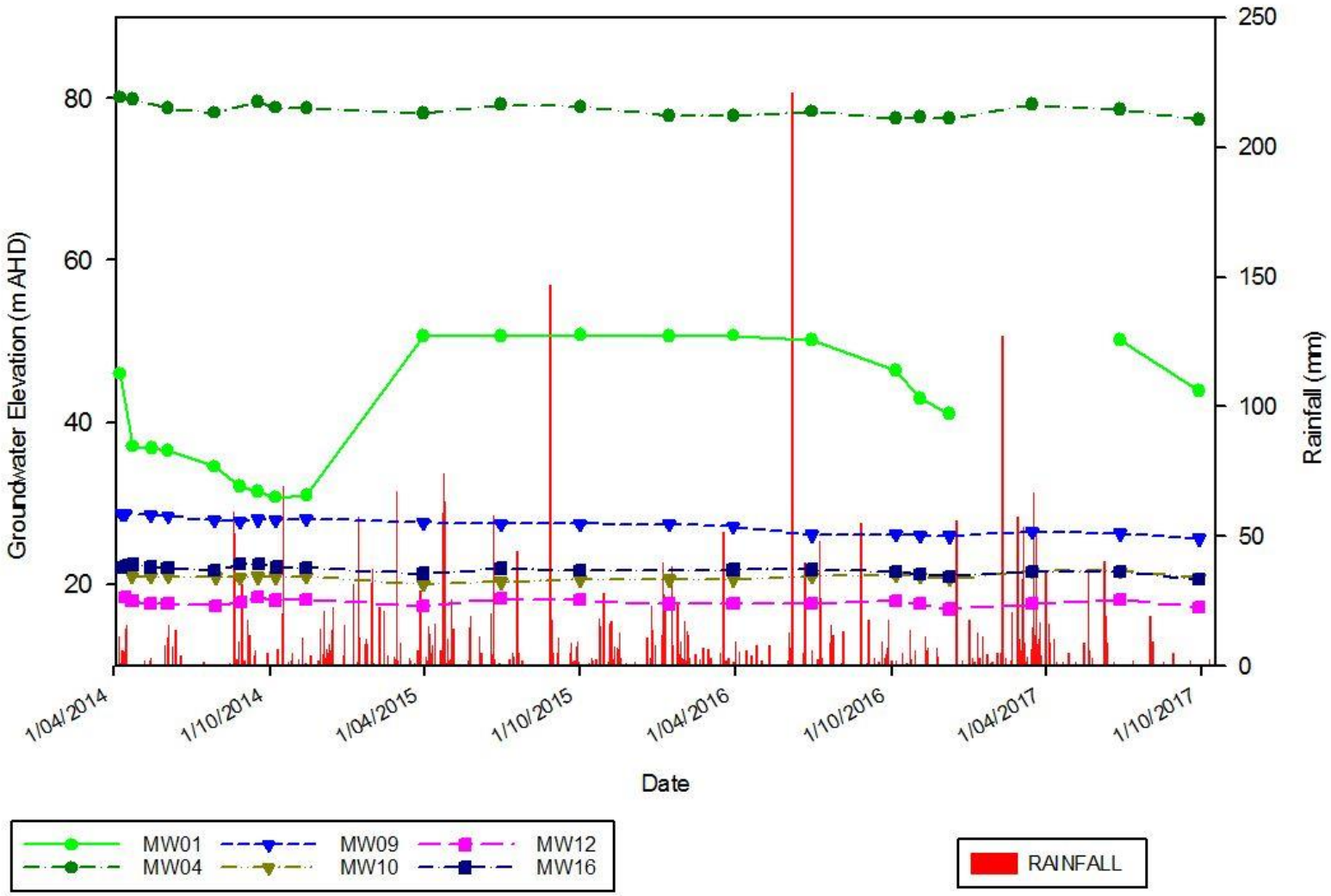
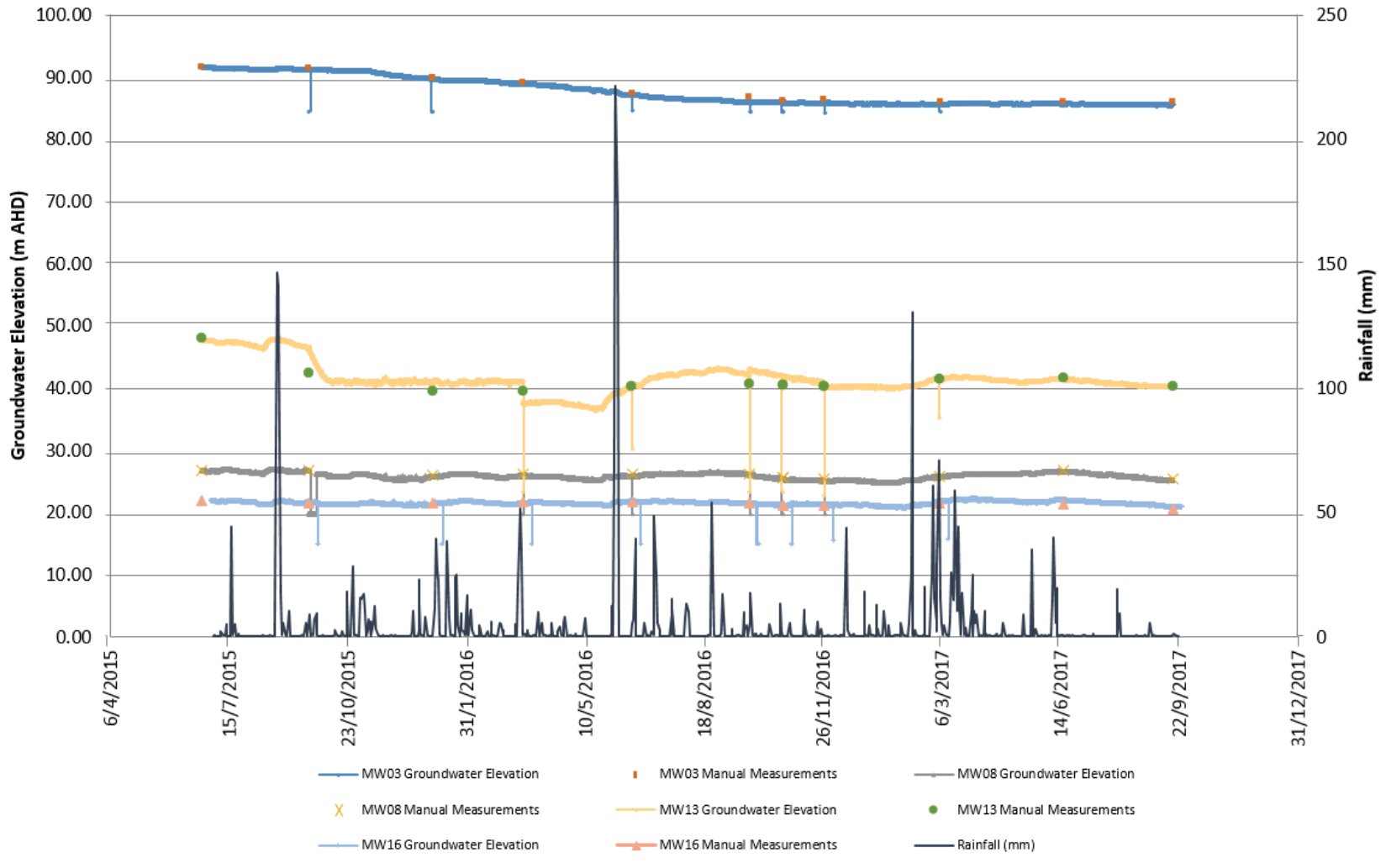


Figure 3: Foxground to Berry Bypass Groundwater Data Logger Elevation Data



Attachment B - Tabulated Results

Appendix B
Table B1
Event 12 - Field Parameters

			Field					
			Dissolved Oxygen (Field) (Filtered	Electrical Conductivity (Field)	pH (Field)	Redox	Temp (Field)	
			mg/L	µS/cm	pH Units	mV	oC	
EQL								
ADWG 2011 Aesthetic				890[#2]	6.5-8.5[#1]			
ADWG 2011 Health								
ANZECC 2000 - Stock Watering								
ANZECC 2000 FW 95%								
Lowland rivers (ANZECC 2000)				300	6.5-8			
SampleCode	**Field_ID**	**Sampled_Date**						
MW01_27 Sep 17_-	MW01	27/09/2017	1.52	3450	8.27	266	20.3	
MW04_27 Sep 17_-	MW04	27/09/2017	0.92	170	6.81	269	19.69	
MW09_27 Sep 17_-	MW09	27/09/2017	0.73	1860	7.5	105	20.74	
MW10_27 Sep 17_-	MW10	27/09/2017	0.41	3220	7.32	124	18.27	
MW12_27 Sep 17_-	MW12	27/09/2017	0.53	437	6.32	252	17.68	
MW16_27 Sep 17_-	MW16	27/09/2017	3.77	579	7.17	168	18.13	
Statistical Summary								
Number of Results			6	6	6	6	6	
Number of Detects			6	6	6	6	6	
Minimum Concentration			0.41	170	6.32	1.5	17.68	
Minimum Detect			0.41	170	6.32	1.5	17.68	
Maximum Concentration			3.77	3450	8.27	269	20.74	
Maximum Detect			3.77	3450	8.27	269	20.74	
Average Concentration			1.3	1619	7.2	180	19	
Median Concentration			0.825	1219.5	7.245	210	18.98	
Standard Deviation			1.3	1453	0.66	105	1.3	
Number of Guideline Exceedances			0	5	2	0	0	
Number of Guideline Exceedances(Detects Only)			0	5	2	0	0	

Env Stds Comments

#1:While extreme ph values (<4 and >11) may adversely affect health.

#2: EC value divided by 0.67 from TDS criterion value.

Appendix B
Table B2
Event 12 Analytical Results

			Metals								BTEX & MAH						TRH - NEPM 2013						TPH - NEPM 1999					PAH
			Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	C6 - C10 less BTEX (F1)	C6 - C10 Fraction	>C10 - C16 less Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	C6 - C 9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total) - Lab calc	Naphthalene
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L
EQL			0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005	1	1	1	1	2	3	0.02	0.02	0.05	0.05	0.1	0.1	0.02	0.05	0.1	0.1	0.1	10
ADWG 2011 Aesthetic						1[#1]				3[#2]		25[#3]	3[#4]			20[#5]												
ADWG 2011 Health			0.01	0.002		2	0.01	0.001	0.02		1	800	300			600												
ANZECC 2000 - Stock Watering			0.5	0.01	1	0.5[#6]	0.1	0.002	1	20																		
ANZECC 2000 FW 95%				0.0002	0.001[#7]	0.0014	0.0034	0.0006	0.011	0.008	950			350														16
Lowland rivers (ANZECC 2000)																												
SampleCode	**Field_ID**	**Sampled_Date-Time**																										
S17-Se36079	MW04	27/09/2017	<0.001	<0.0002	0.002	0.002	<0.001	<0.0001	0.001	0.006	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Se36080	MW09	27/09/2017	<0.001	<0.0002	<0.001	0.001	<0.001	<0.0001	0.001	0.029	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Se36081	MW10	27/09/2017	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.002	0.022	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Se36082	MW12	27/09/2017	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.008	0.019	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Se36083	MW16	27/09/2017	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.002	0.021	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Se36084	DUPL01	27/09/2017	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.001	0.028	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
S17-Se36085	MW01	27/09/2017	0.003	<0.0002	<0.001	0.001	<0.001	<0.0001	0.002	0.017	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
Statistical Summary																												
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			1	0	1	3	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.001	0.006	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
Minimum Detect			0.003	ND	0.002	0.001	ND	ND	0.001	0.006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			0.003	<0.0002	0.002	0.002	<0.001	<0.0001	0.008	0.029	<1	<1	<1	<1	<2	<3	<0.02	<0.02	<0.05	<0.05	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.1	<10
Maximum Detect			0.003	ND	0.002	0.002	ND	ND	0.008	0.029	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.00086	0.0001	0.00071	0.00086	0.0005	0.00005	0.0024	0.02	0.5	0.5	0.5	0.5	1	1.5	0.01	0.01	0.025	0.025	0.05	0.05	0.01	0.025	0.05	0.05	0.05	5
Median Concentration			0.0005	0.0001	0.0005	0.0005	0.0005	0.00005	0.002	0.021	0.5	0.5	0.5	0.5	1	1.5	0.01	0.01	0.025	0.025	0.05	0.05	0.01	0.025	0.05	0.05	0.05	5
Standard Deviation			0.00094	0	0.00057	0.00056	0	0	0.0025	0.0077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances			0	0	1	1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	1	1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Env Stds Comments

#1:from corrosion of pipes/fittings by salt, low ph water. taste threshold 3 mg/l. high concentrations colour water blue/green. >1 mg/l may stain fitings. >2 mg/l can cause ill effects in some people.
#2:usually from corrosion of galvanised pipes/fittings and brasses. natural concentrations generally <0.01 mg/l. taste problems >3 mg/l.
#3:occurs naturally in petrol and natural gas, forest-fire emissions.
#4:natural component of petrol and petroleum products.
#5:Could occur in drinking water as a pollutant, or from solvent used for bonding plastic fittings.
#6:Guideline value for sheep
#7:In absence of Total Cr guideline Cr(VI) guideline has been adopted

Appendix B
Table B3
Duplicate Summary Table Event 12

Field Duplicates (WATER)
Filter: SDG in('29 Sep 2017')

SDG	29-Sep-17	29-Sep-17	
Field ID	MW09	DUPL01	**RPD**
Sampled Date/Time	27/09/2017	27/09/2017	

Chem_Group	ChemName	Units	EQL			
Metals	Arsenic (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Cadmium (Filtered)	mg/l	0.0002	<0.0002	<0.0002	0
	Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Copper (Filtered)	mg/l	0.001	0.001	<0.001	0
	Lead (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Mercury (Filtered)	mg/l	0.0001	<0.0001	<0.0001	0
	Nickel (Filtered)	mg/l	0.001	0.001	0.001	0
	Zinc (Filtered)	mg/l	0.005	0.029	0.028	4
BTEX & MAH	Benzene	µg/l	1	<1.0	<1.0	0
	Toluene	µg/l	1	<1.0	<1.0	0
	Ethylbenzene	µg/l	1	<1.0	<1.0	0
	Xylene (o)	µg/l	1	<1.0	<1.0	0
	Xylene (m & p)	µg/l	2	<2.0	<2.0	0
	Xylene Total	µg/l	3	<3.0	<3.0	0
TRH - NEPM 2013	C6 - C10 less BTEX (F1)	mg/l	0.02	<0.02	<0.02	0
	C6 - C10 Fraction	mg/l	0.02	<0.02	<0.02	0
	>C10 - C16 less Naphthalene (F2)	mg/l	0.05	<0.05	<0.05	0
	>C10 - C16 Fraction	mg/l	0.05	<0.05	<0.05	0
	>C16 - C34 Fraction (F3)	mg/l	0.1	<0.1	<0.1	0
	>C34 - C40 Fraction (F4)	mg/l	0.1	<0.1	<0.1	0
TPH - NEPM 1999	C6 - C 9 Fraction	mg/l	0.02	<0.02	<0.02	0
	C10 - C14 Fraction	mg/l	0.05	<0.05	<0.05	0
	C15 - C28 Fraction	mg/l	0.1	<0.1	<0.1	0
	C29 - C36 Fraction	mg/l	0.1	<0.1	<0.1	0
	C10 - C36 (Sum of Total) - Lab calc	mg/l	0.1	<0.1	<0.1	0
PAH	Naphthalene	µg/l	10	<10.0	<10.0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

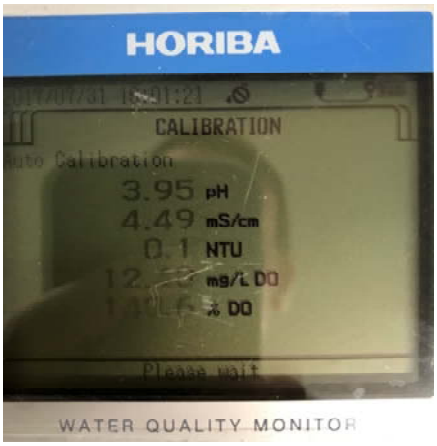
Attachment C - Field Sheets and Calibration Certificates (provided by Fulton Hogan)

Water Quality Meter Controller: Horiba, model U-5000, HGS No. 5EN23LDS, manufactured Feb 2013
Water Quality meter probe: Horiba, model U-52, HGS No. V6TTNMK1, manufactured Feb 2013

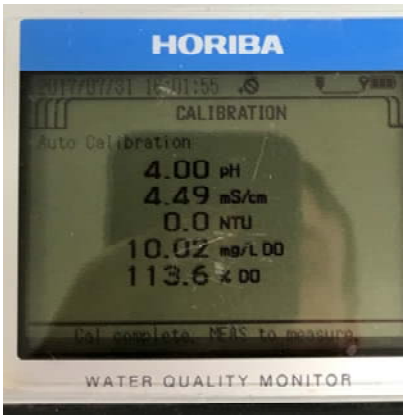
(Provided by Fulton Hogan)
Equipment Calibration Record

Month, Year	Date	Item	Serial	Current Reading	Calibrated To	By
May-17	2/05/2017	Horiba WQ Probe		3.95	4.00	JA
May-17	24/05/2017	Horiba WQ Probe		4.13	4.00	JA
Jun-17	8/06/2017	Horiba WQ Probe		4.39	4.00	JA
Jun-17	14/06/2017	Horiba WQ Probe		4.12	4.00	JA
Jul-17	31/07/2017	Horiba WQ Probe		3.88	4.00	JA
Aug-17	1/07/2017	Horiba WQ Probe		3.95	4.00	JA
Sep-17	25/09/2017	Horiba WQ Probe		3.95	4.00	JA

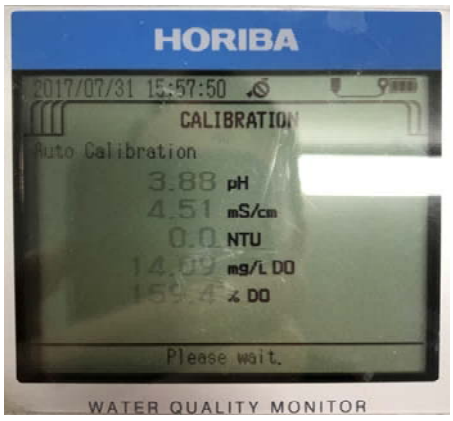
Before Calibration (pH) 25/09/2017



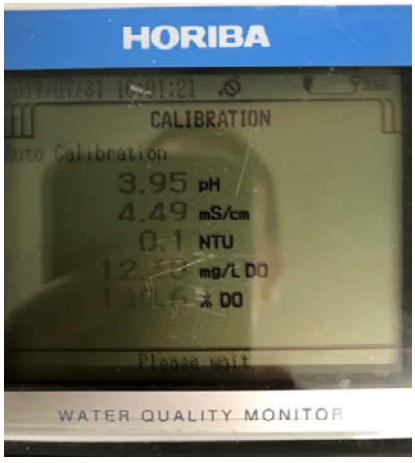
After Calibration (pH) 25/09/2017



Before Calibration (Conduct.) 25/09/2017



After Calibration (Conduct.) 25/09/2017



GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID
Project Number: 21/24306	MW01
Project Name: Foxground to Berry Bypass	Sample ID: 14MW01
Client: Fulton Hogan	Date: 27/09/2017
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 8.080	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 12.192	QA Collected: NO

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (ms/cm) (us/cm)	pH	Eh (mv)	Temp (°C)	Comments
11.32	3	8.645	7.17	0.007	8.73	276	23.22	clear, no odour, no sheen 1.7ppt
11.36	4.5	9.400	2.18	3.44	8.42	307	20.93	" " 1.8ppt
11.42	5.5	9.855	0.73	3.53	8.36	304	20.47	" " 1.9ppt
11.46	7.0	10.290	1.06	3.52	8.29	243	20.23	" " 1.9ppt
11.51	8.5	10.805	0.93	3.50	8.26	257	20.19	" " 1.8ppt
11.56	9.5	11.160	1.37	3.45	8.27	261	20.24	" " 1.8ppt
12.00 MW	10.5	11.525	1.52	3.45	8.27	266	20.30	" " 1.8ppt
Post Sample Parameters								

Number of Bottles: 4

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW04
Project Number: 21/24306	
Project Name: Foxground to Berry Bypass	Sample ID: MW04
Client: Fulton Hogan	Date: 27/9/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.633	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 3.297	QA Collected: NO

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C ~~(us/cm)~~ mS/cm	pH	Eh (mv)	Temp (°C)	Comments
1.13	1	3.310	3.78	0.180	7.47	251	~~19.35~~	Clear, no odour, no sheen.
1.15	2	3.355	2.52	0.174	7.09	261	19.24	" " 0.1ppt
1.19	4	3.370	1.96	0.172	6.90	265	19.29	" "
1.23	6	3.430	2.12	0.171	6.886	269	19.46	" " 0.1ppt
1.27	8	3.445	1.14	0.170	6.864	271	19.67	" " "
1.29	9	3.475	0.92	0.170	6.881	269	19.69	" " "
Post Sample Parameters								

Number of Bottles: 4

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID
Project Number: 21/24306	MW09
Project Name: Foxground to Berry Bypass	Sample ID: MW09
Client: Fulton Hogan	Date: 27/9/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 6.726	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 9.00m	QA Collected: DUPLOT

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C ~~(us/cm)~~ mS/cm	pH	Eh (mv)	Temp (°C)	Comments
2.05	1	7.130	3.17	1.74	7.52	206	21.71	clear, no odour, no sheen 0.9ppt
2.08	2.5	7.020	1.64	1.76	7.54	209	21.39	" "
2.12	4.5	7.080	1.49	1.86	7.54	121	21.82	slightly grey turbid.
2.24	5.5	7.200	0.77	1.86	7.51	91	21.25	" "
2.27	7	7.317	0.66	1.84	7.49	94	21.03	" "
2.29	8	7.375	0.73	1.86	7.50	105	20.74	" "
Post Sample Parameters								

Number of Bottles: 8

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW10
Project Number: 21/24306	Sample ID: MW10
Project Name: Foxground to Berry Bypass	Date: 27/9/17
Client: Fulton Hogan	Sampler: J.Curran
Site: Foxground to Berry Bypass	Purge Method: Low Flow
Well Condition (i.e road box, locked etc): Road box	Sample Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 11.435m	Casing Type: PVC
Depth of PSH (from TOC):	Well Diameter: 50mm
Depth to Bottom of Casing (BOC) from TOC:	Calculated Bore Volume(L):
Casing Stickup: -0.05m	QA Collected: No
Depth to Water Table Post - purge (from TOC): 11.490	

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C (~~us/cm~~ ms/cm)	pH	Eh (mv)	Temp (°C)	Comments
3.01	1	11.490	2.73	3.16	7.49	188	20.60	Clear, no odour, no sheen. 1.7ppt
3.04	2.5	11.500	1.12	3.20	7.33	161	18.88	" "
3.06	3.5	11.510	0.82	3.21	7.33	161	18.64	" " 1.7ppt
3.09	5	11.465	0.92	3.16	7.36	149	18.92	" "
3.13	7	11.505	0.53	3.20	7.34	135	18.45	" "
3.17	9	11.500	0.43	3.22	7.33	127	18.28	" "
3.19	10	11.520	0.41	3.22	7.32	124	18.27	" "
Post Sample Parameters								

Number of Bottles: 4

Comments: Spray grass has been added around well. Well is now at ground level.

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	
Project Number: 21/24306	Borehole ID: MW12
Project Name: Foxground to Berry Bypass	Sample ID: MW12
Client: Fulton Hogan	Date: 27/9/17
Site: Foxground to Berry Bypass	Sampler: J.Curran
Well Condition (i.e road box, locked etc): Road box	Purge Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 7.190m	Sample Method: Low Flow
Depth of PSH (from TOC):	Casing Type: PVC
Depth to Bottom of Casing (BOC) from TOC:	Well Diameter: 50mm
Casing Stickup:	Calculated Bore Volume(L):
Depth to Water Table Post - purge (from TOC): 8.735	QA Collected: No

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C. ~~(us/cm)~~ mS/cm	pH	Eh (mv)	Temp (°C)	Comments
3.51	1.5	7.635	3.15	0.459	6.79	242	16.96	Clear, lw odour, no sheen
3.54	2.5	7.670	2.21	0.448	6.59	307	18.18	" " 0.2ppt
3.57	4	8.105	1.72	0.442	6.53	326	17.92	" " "
3.59	5.5	8.295	3.64	0.446	6.46	303	17.66	" " "
4.02	~~6~~ 7	8.455	1.17	0.442	6.47	288	17.77	" " "
4.04	8	8.515	0.98	0.441	6.44	280	17.73	Turbid, no odour, no sheen
4.06	9	8.613	0.69	0.439	6.39	265	17.67	" " "
4.08	10	8.703	0.53	0.437	6.32	252	17.68	" " "
Post Sample Parameters								

Number of Bottles: 4

Comments: well field shut.

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

GROUNDWATER PURGING AND SAMPLING FIELD SHEET

PROJECT DETAILS	Borehole ID: MW16
Project Number: 21/24306	Sample ID: MW16
Project Name: Foxground to Berry Bypass	Date:
Client: Fulton Hogan	Sampler: J.Curran
Site: Foxground to Berry Bypass	Purge Method: Low Flow
Well Condition (i.e road box, locked etc): Road box	Sample Method: Low Flow
Depth to Water Table Pre-purge (from TOC): 2.236	Casing Type: PVC
Depth of PSH (from TOC):	Well Diameter: 50mm
Depth to Bottom of Casing (BOC) from TOC:	Calculated Bore Volume(L):
Casing Stickup:	QA Collected: NO
Depth to Water Table Post - purge (from TOC):	

FIELD PARAMETERS (RECORDED USING YSI Pro Plus)

Time	Volume (L)	Depth to Water from TOC(m)	D.O (mg/L)	E.C ~~(us/cm)~~ mS/cm	pH	Eh (mv)	Temp (°C)	Comments
8.57	2	2.630	8.67	0.568	7.16	197	17.75	clear, no odor, no sheen
9.01	4	2.698	5.66	0.563	7.20	177	17.93	" " 0.3ppt
9.03	5	2.758	5.02	0.580	7.28	173	18.07	" "
9.05	6	2.695	4.42	0.561	7.19	170	18.11	" " 0.3ppt
9.07	7	2.690	7.28	0.577	7.14	174	18.27	" "
9.11	9	2.700	4.69	0.579	7.16	169	18.24	" " 0.3ppt
9.13	10	2.660	~~8~~ 4.36	0.568	7.17	168	18.11	" "
9.15	11	2.675	3.77	0.579	7.17	168	18.13	" "
Post Sample Parameters								

Number of Bottles: 4

Comments:

Well Volume Calculation (50mm diameter) 3.8xH (H=height of water column)

CALCULATIONS

Client: Fulton Hogan
Project: FBB
Subject: Loggers

Job no. 2124306
Calcs by: Jane Curran
Checked by:
Sheet of
Date
Date 27/9/17

	Time	Depth (m).
MW03	12.25pm	17.07 m
MW16	8.46am	2.23m
MW13	9.49am	9.560m
MW08	10.00am	3.045

Barometer removed at 10.30am

Attachment D - Laboratory Certificates

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**GHD Pty Ltd NSW**
Contact name:	Jane Curran
Project name:	FOXGROUND TO BERRY BYPASS
Project ID:	2124306/01
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Sep 29, 2017 9:30 AM
Eurofins | mgt reference:	**565517**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 12.2 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☑ Sample containers for volatile analysis received with zero headspace.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Jane Curran - jane.curran@ghd.com.

CHAIN OF CUSTODY RECORD

☑ Sydney Laboratory
Unit F3 Bld F, 16 Mars Rd, Lane Cove West, NSW 2066
02 9900 8400 EnviroSampleNSW@eurofins.com

Brisbane Laboratory
Unit 1, 21 Smallwood Pl Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

Perth Laboratory
Unit 2, 31 Leach Highway, Kewdale WA 6105
08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
2 Kingston Town Close, Oakleigh, VIC 3166
03 8564 5000 EnviroSampleVic@eurofins.com

Company	GHD Pty Ltd	Project №	2124306/01	Project Manager	Stefan Charteris
Address	2/57 Graham Street, Nowra 2541 NSW	Project Name	Foxground to Berry Bypass	Report Format	
Contact Name	Jane Curran				
Phone №	(02) 4424 4960				
Special Direction					
Purchase Order					
Quote ID №	150501GHD				

Relinquished by: Jane Curran — 12pm — 28 / 09 / 17

Email for Results: jane.curran@ghd.com, stefan.charteris@ghd.com, nicole.rosen@ghd.com

Turn Around Requirements: ☐ Overnight (9am)* ☐ 1 Day* ☐ 2 Day* ☐ 3 Day* ☑ 5 Day ☐ Other (* Surcharges apply)

№	Client Sample ID	Date	Matrix	M8 (Heavy Metals)	TPH	BTEX	Containers: 1L Plastic	250mL Plastic	125mL Plastic	250mL Amber Glass	40mL vial	125mL Amber Glass	Jar	1L amber	Other ( )	Sample Comments / DG Hazard Warning
1	MW04	27/09/17	w	X	X	X		1			2			1		Metals have been field filtered
2	MW09	27/09/17	w	X	X	X		1			2			1		
3	MW10	27/09/17	w	X	X	X		1			2			1		
4	MW12	27/09/17	w	X	X	X		1			2			1		
5	MW16	28/09/17	w	X	X	X		1			2			1		
6	DUPL01	27/09/17	w	X	X	X		1			2			1		
7	MW01	27/09/17	w	X	X	X		1			2			1		
8																
9																
10																
	Total Counts			7	7	7		7			7			7		

Method of Shipment: Courier (#) ☐ Hand Delivered ☐ Postal — Name: Jane Curran — Signature: — Date: 28/9 — Time: 12pm

Laboratory Use Only

☑ Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Signature	Date: 29.9.17	Time: 9:36am	Temperature	12.2
Received By		SYD | BNE | MEL | PER | ADL | NEW | DAR	Signature	Date: __/__/__	Time: __:__	Report №	565517

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ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: FOXGROUND TO BERRY BYPASS
Project ID: 2124306/01

Order No.:
Report #: 565517
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Sep 29, 2017 9:30 AM
Due: Oct 9, 2017
Priority: 5 Day
Contact Name: Jane Curran

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Metals M8 filtered	BTEX	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	MW04	Sep 27, 2017		Water	S17-Se36079	X	X	X
2	MW09	Sep 27, 2017		Water	S17-Se36080	X	X	X
3	MW10	Sep 27, 2017		Water	S17-Se36081	X	X	X
4	MW12	Sep 27, 2017		Water	S17-Se36082	X	X	X
5	MW16	Sep 27, 2017		Water	S17-Se36083	X	X	X
6	DUPL01	Sep 27, 2017		Water	S17-Se36084	X	X	X
7	MW01	Sep 27, 2017		Water	S17-Se36085	X	X	X
Test Counts						7	7	7

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Certificate of Analysis

GHD Pty Ltd NSW
Level 15, 133 Castlereagh Street
Sydney
NSW 2000

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Jane Curran**

Report **565517-W**
Project name FOXGROUND TO BERRY BYPASS
Project ID 2124306/01
Received Date Sep 29, 2017

Client Sample ID			**MW04**	**MW09**	**MW10**	**MW12**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**S17-Se36079**	**S17-Se36080**	**S17-Se36081**	**S17-Se36082**
Date Sampled			**Sep 27, 2017**	**Sep 27, 2017**	**Sep 27, 2017**	**Sep 27, 2017**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	133	93	90	131
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	0.002	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.002	0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.001	0.001	0.002	0.008
Zinc (filtered)	0.005	mg/L	0.006	0.029	0.022	0.019

Client Sample ID			MW16	DUPL01	MW01
Sample Matrix			Water	Water	Water
Eurofins | mgt Sample No.			S17-Se36083	S17-Se36084	S17-Se36085
Date Sampled			Sep 27, 2017	Sep 27, 2017	Sep 27, 2017
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1
BTEX					
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	74	100	78
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene[N02]	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1
Heavy Metals					
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	0.003
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.002	0.001	0.002
Zinc (filtered)	0.005	mg/L	0.021	0.028	0.017

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Sep 29, 2017	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 29, 2017	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 29, 2017	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX	Sydney	Sep 29, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Metals M8 filtered	Sydney	Sep 29, 2017	28 Day
- Method: LTM-MET-3040 Metals in Waters by ICP-MS			

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ABN– 50 005 085 521
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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
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NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: GHD Pty Ltd NSW
Address: Level 15, 133 Castlereagh Street
Sydney
NSW 2000

Project Name: FOXGROUND TO BERRY BYPASS
Project ID: 2124306/01

Order No.:
Report #: 565517
Phone: 02 9239 7100
Fax: 02 9239 7199

Received: Sep 29, 2017 9:30 AM
Due: Oct 9, 2017
Priority: 5 Day
Contact Name: Jane Curran

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Metals M8 filtered	BTEX	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217						X	X	X
Brisbane Laboratory - NATA Site # 20794								
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	MW04	Sep 27, 2017		Water	S17-Se36079	X	X	X
2	MW09	Sep 27, 2017		Water	S17-Se36080	X	X	X
3	MW10	Sep 27, 2017		Water	S17-Se36081	X	X	X
4	MW12	Sep 27, 2017		Water	S17-Se36082	X	X	X
5	MW16	Sep 27, 2017		Water	S17-Se36083	X	X	X
6	DUPL01	Sep 27, 2017		Water	S17-Se36084	X	X	X
7	MW01	Sep 27, 2017		Water	S17-Se36085	X	X	X
Test Counts						7	7	7

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	86			70-130	Pass	
TRH C10-C14	%	101			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	97			70-130	Pass	
Toluene	%	101			70-130	Pass	
Ethylbenzene	%	104			70-130	Pass	
m&p-Xylenes	%	106			70-130	Pass	
o-Xylene	%	108			70-130	Pass	
Xylenes - Total	%	107			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	109			70-130	Pass	
TRH C6-C10	%	95			70-130	Pass	
TRH >C10-C16	%	102			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S17-Oc02228	NCP	%	80			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S17-Oc02228	NCP	%	90			70-130	Pass	
Toluene	S17-Oc02228	NCP	%	93			70-130	Pass	
Ethylbenzene	S17-Oc02228	NCP	%	99			70-130	Pass	
m&p-Xylenes	S17-Oc02228	NCP	%	99			70-130	Pass	
o-Xylene	S17-Oc02228	NCP	%	98			70-130	Pass	
Xylenes - Total	S17-Oc02228	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S17-Oc02228	NCP	%	88			70-130	Pass	
TRH C6-C10	S17-Oc02228	NCP	%	87			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S17-Se36079	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S17-Se36079	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	S17-Se36079	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	S17-Se36079	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	S17-Se36079	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	S17-Se36079	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	S17-Se36079	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S17-Se36079	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	S17-Se36079	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.

Authorised By

Nibha Vaidya Analytical Services Manager

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Attachment E - Laboratory Quality Assurance and Quality Control Results

Field Program Groundwater

An Intra-laboratory duplicate sample was collected and analysed as part of the groundwater sampling program and the relative percentage differences (RPD) were calculated. Intra-laboratory measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the original sample
Cd = Analyte concentration of the duplicate sample

GHD adopts a nominal acceptance criterion of 30% RPD for field duplicates and splits for inorganics and a nominal acceptance criterion of 50% RPD for field duplicates and splits for organics, however it is noted that this may not always be achieved, or at low analyte concentrations. Groundwater QA/QC results are presented in Table B3, Attachment B. There were no discrepancies in GHD's adopted criterion for RPDs calculated for the intra laboratory duplicate pairs for the analytes tested.

Laboratory Program

The NATA certified laboratory utilised for this assessment (i.e. Eurofins | Mgt) undertook their own quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are provided as Attachment D. In summary:

- All samples were noted to be correctly preserved.
- Samples were extracted within allocated holding times.

Method blank results were less than the Practical Quantitative Level (PQL), and surrogate spike and laboratory control sample recoveries were within laboratory acceptance criteria for majority of the samples collected over the event.

As part of NATA certification laboratories must run a quality assurance (QA) analysis on one matrix spike within 20 samples. To do this, the laboratory determines spike recovery in a Laboratory Control Sample (LCS), a Non-Client Parent (NCP) quality control sample and a Client Parent (CP) quality control and compare them against each other. Spike recoveries from these samples indicate if the laboratory equipment, namely the chromatography, is working correctly and has no background noise. LCS, CP and NCP samples had recovery within the recommended acceptance criteria.

Summary of Quality Assurance / Quality Control Results

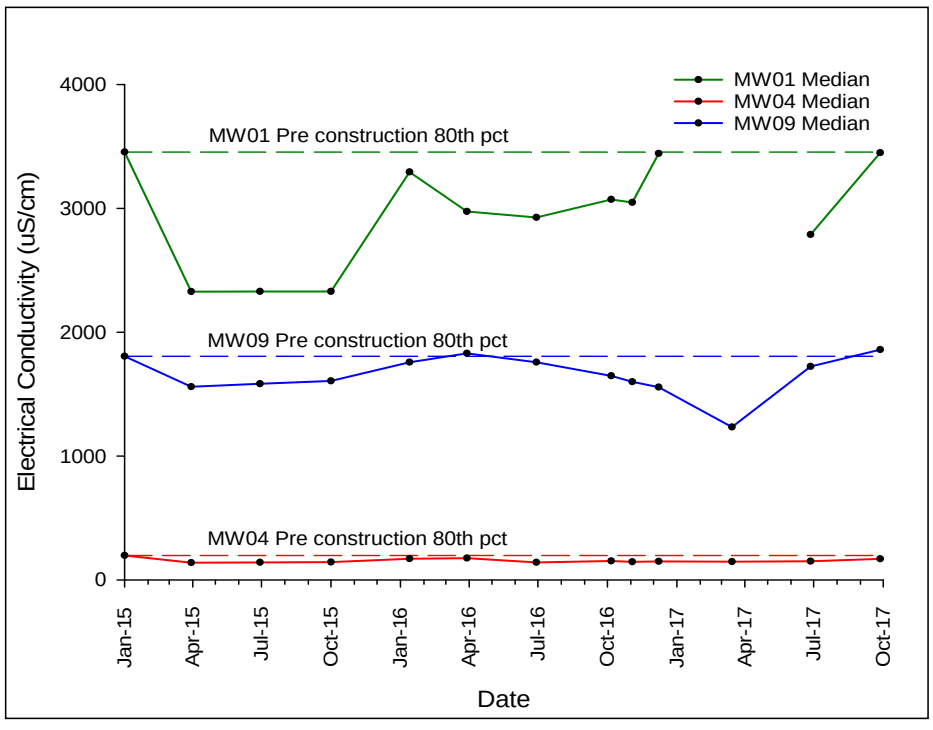
Surrogate recovery in samples MW04 and MW12 for 4-Bromoflurobenzene were 133% and 131% respectively, which is slightly above the recommended acceptance limit of 30 -130% and may be due to matrix interference. RPD results indicate correct sampling procedures were carried out for Event 12 therefore the data is considered valid and of sufficient quality to meet the data quality objectives for the assessment.

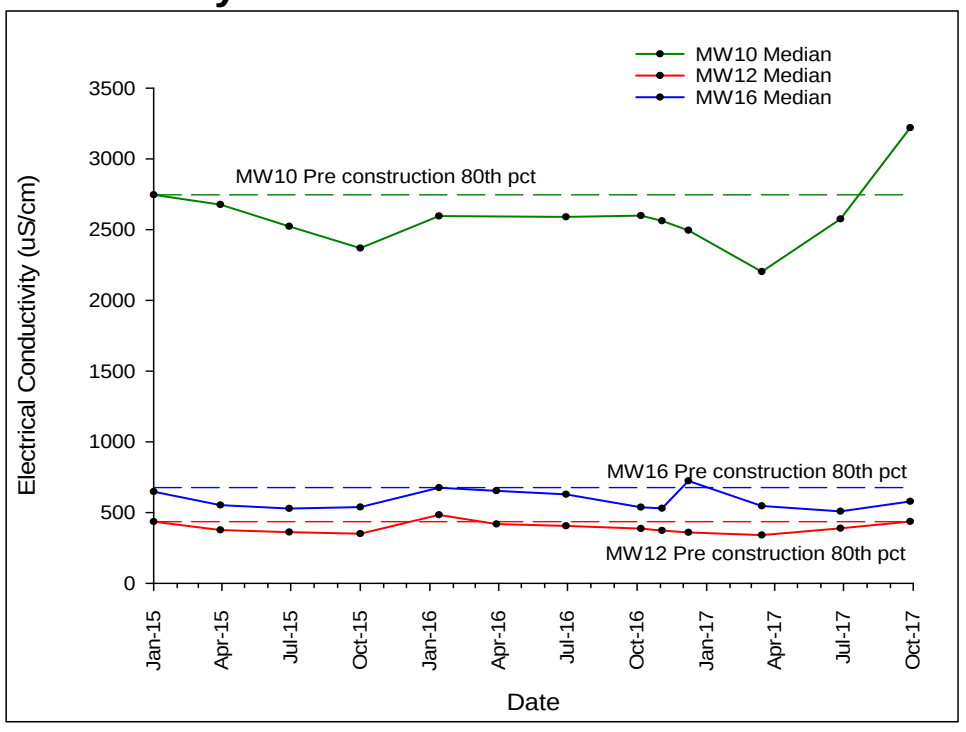
Attachment F - Control Charts and Result Graphs

Control Charts: Electrical Conductivity, pH

Result Graphs: Nickel, Copper, Arsenic, Zinc

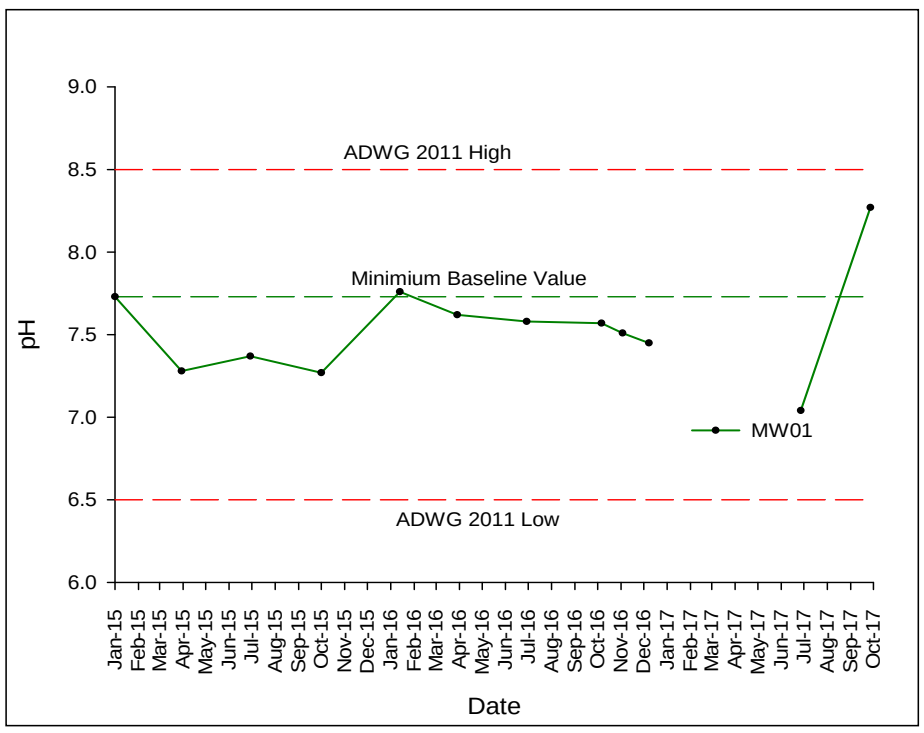
Electrical Conductivity



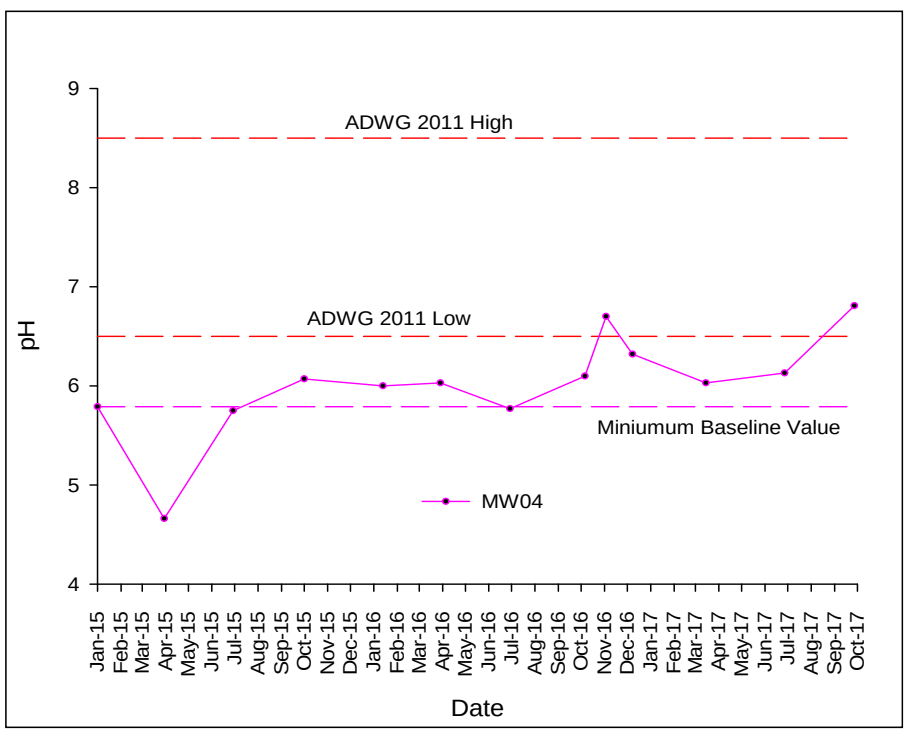


pH

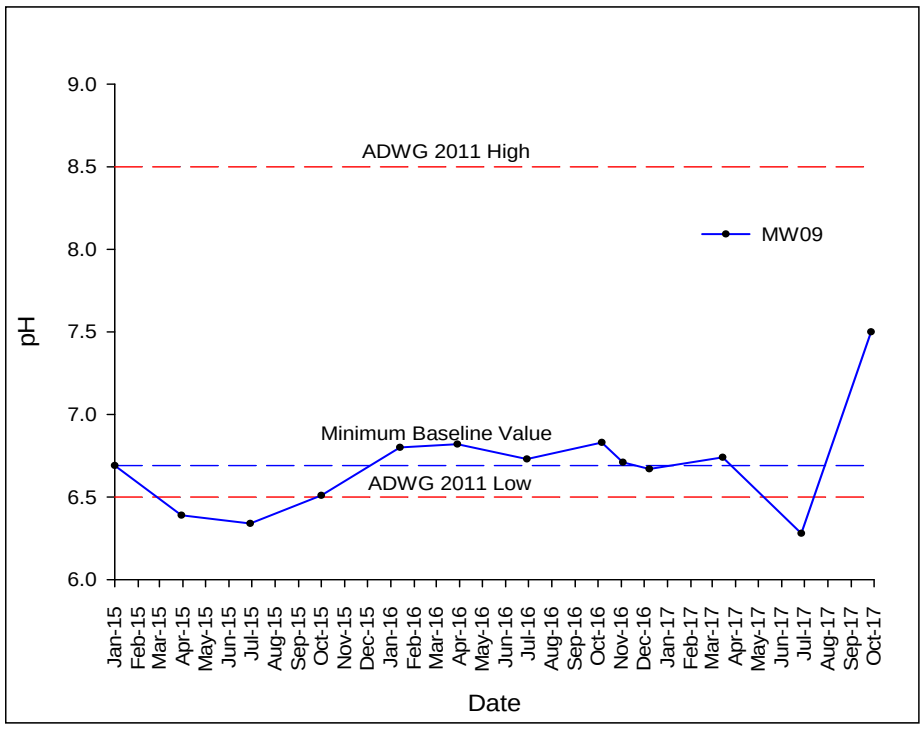
MW01



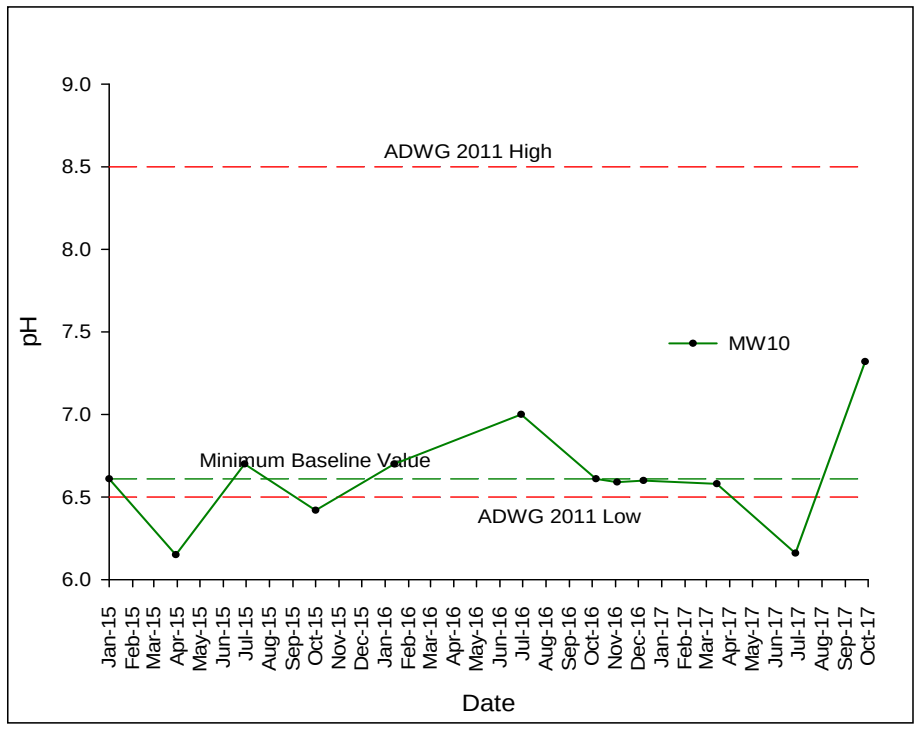
MW04



MW09

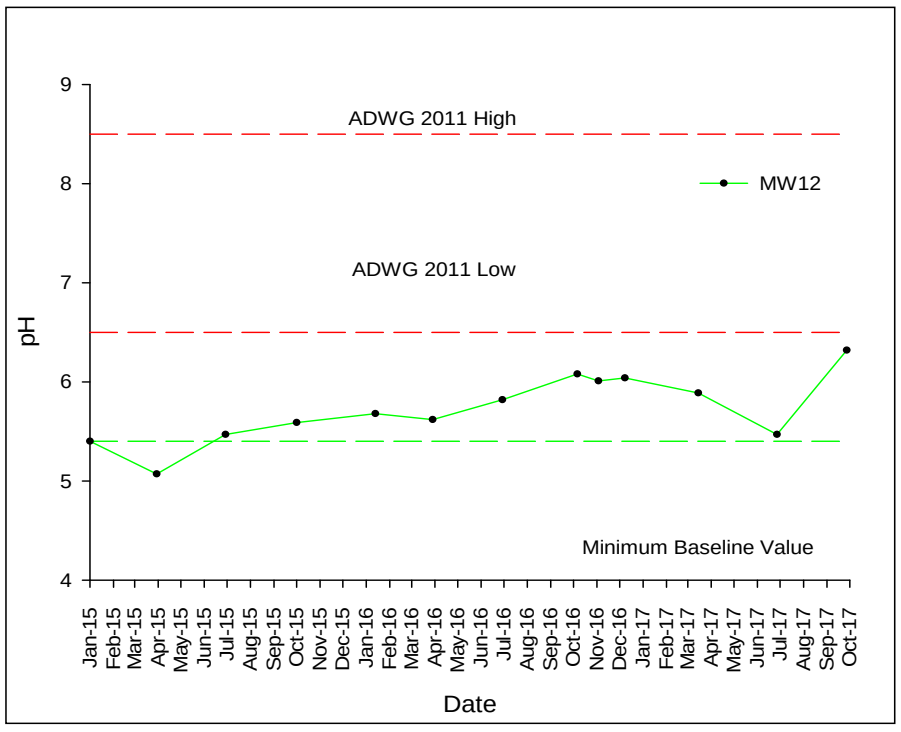


MW10

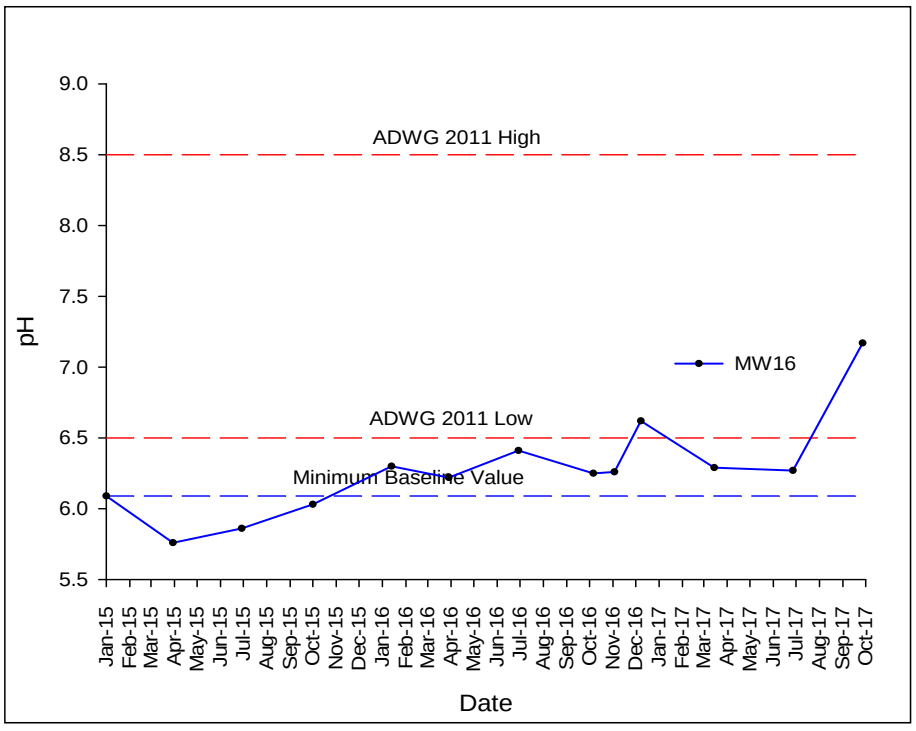


Attachment F
Control Charts

MW12

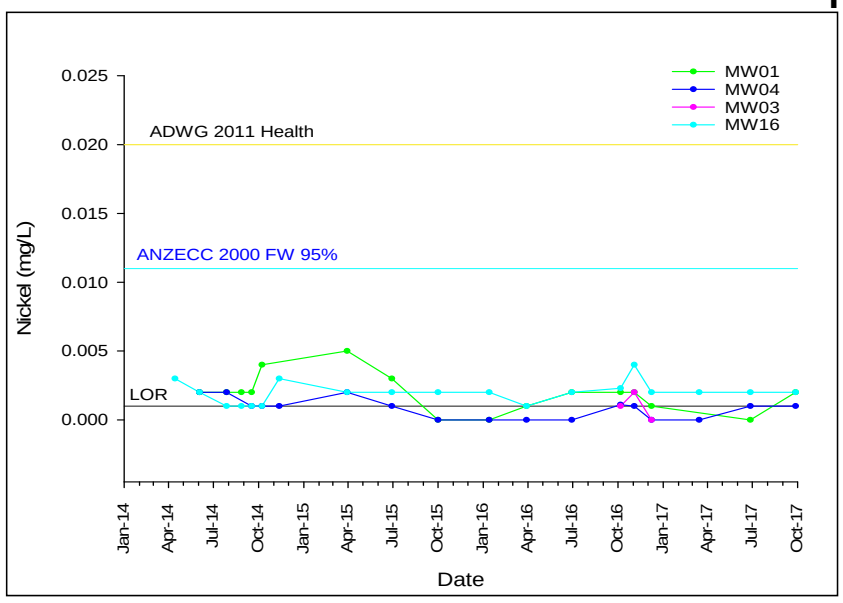


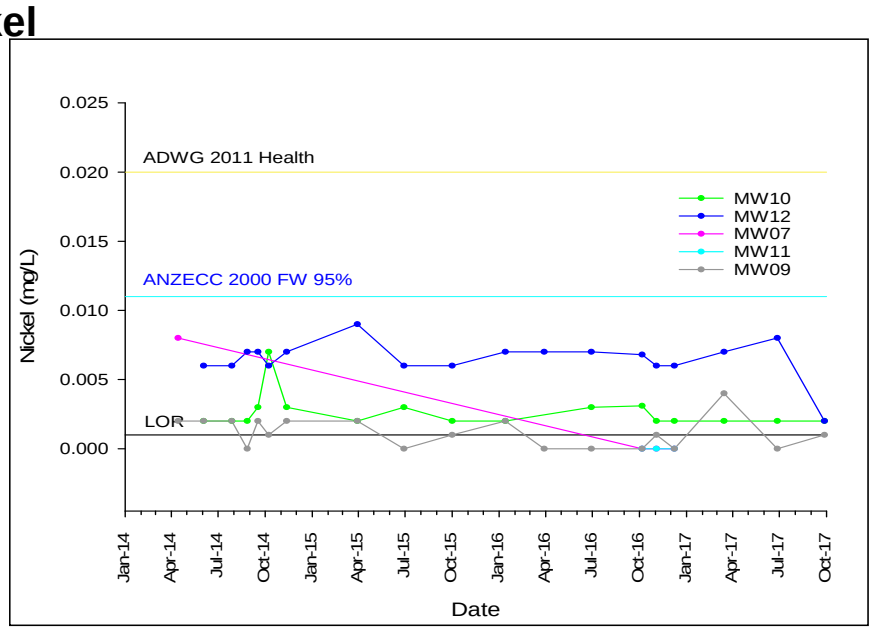
MW16



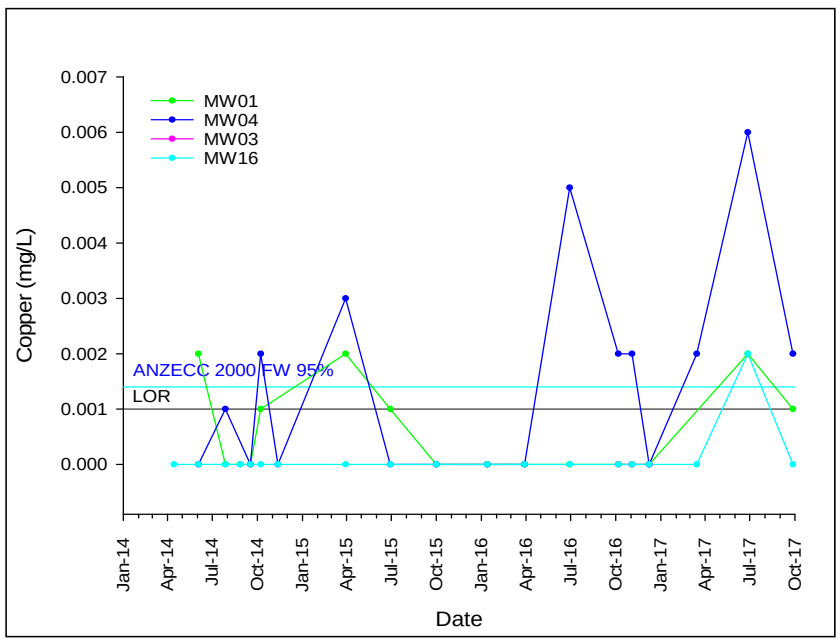
Attachment F
Control Charts

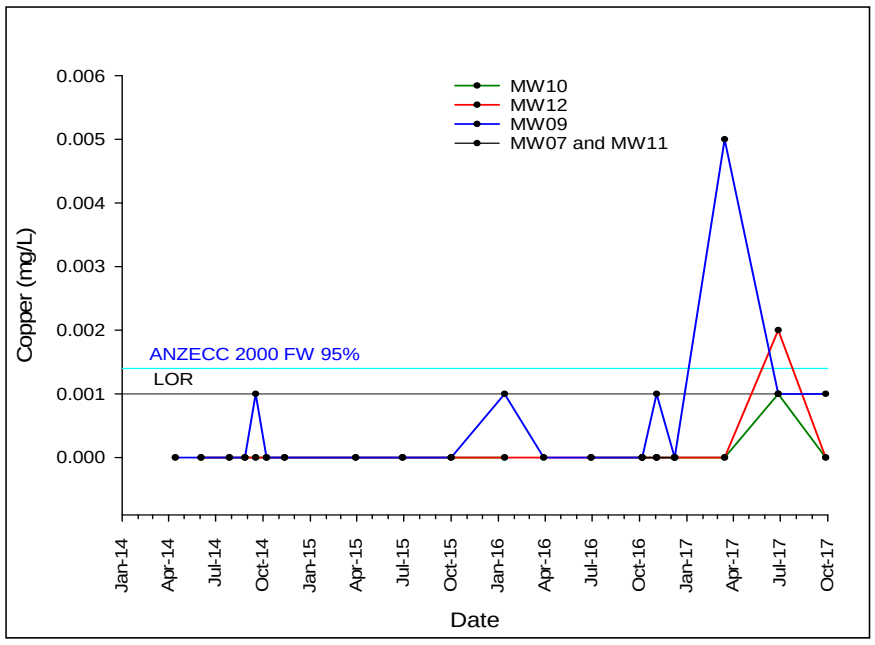
Nickel



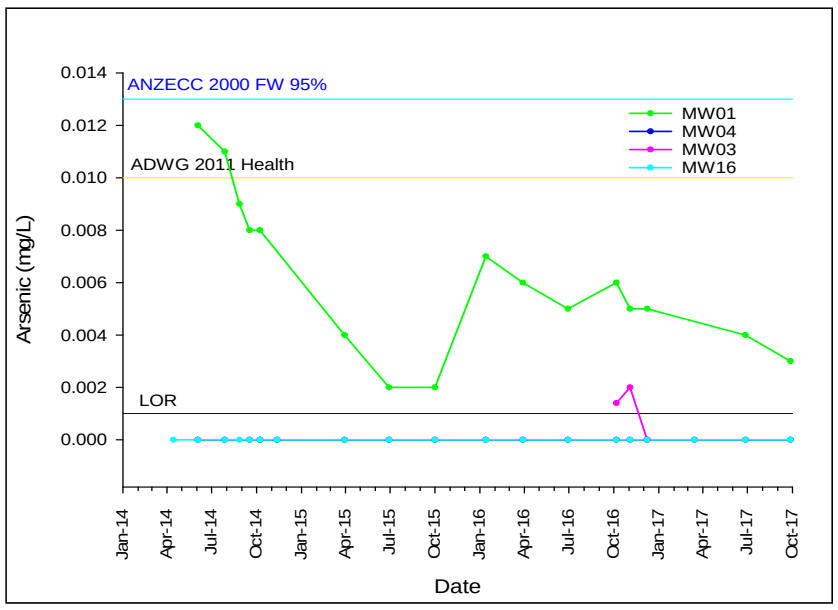


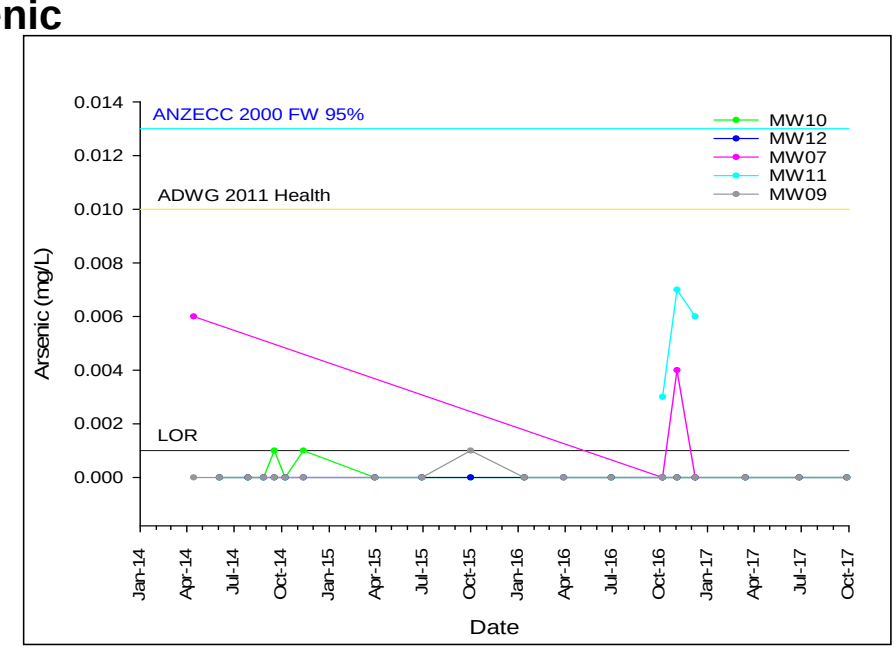
Copper





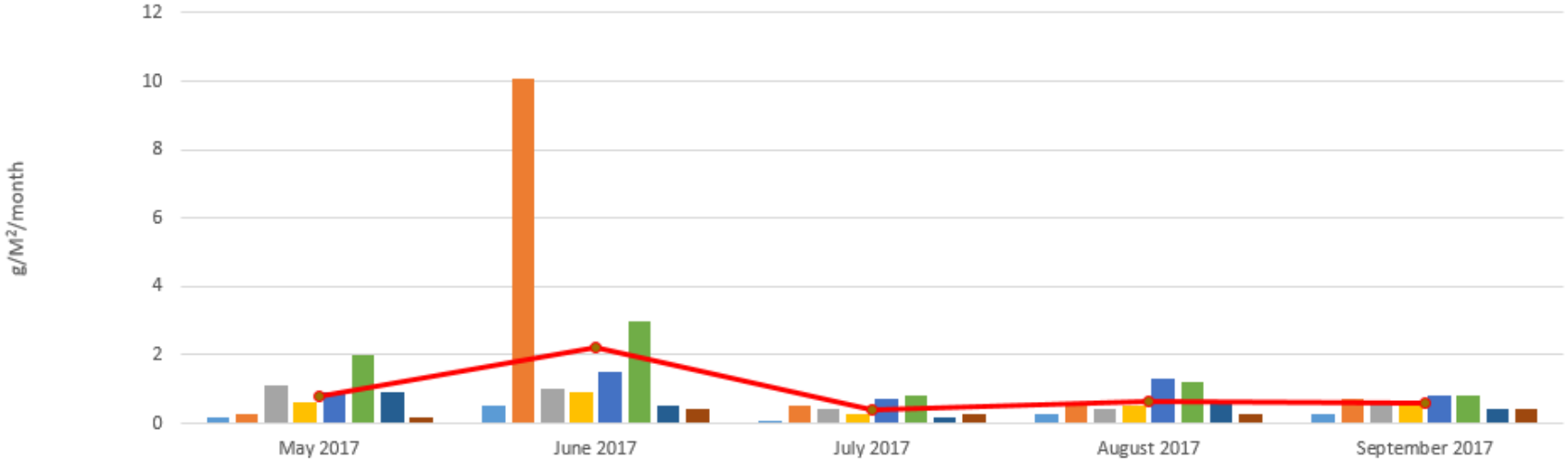
Arsenic





Zinc

Dust deposition monitoring in the reporting period



	May 2017	June 2017	July 2017	August 2017	September 2017
DMG1	0.2	0.5	0.1	0.3	0.3
DMG2	0.3	10.1	0.5	0.5	0.7
DMG3	1.1	1	0.4	0.4	0.6
DMG4	0.6	0.9	0.3	0.5	0.6
DMG5	0.9	1.5	0.7	1.3	0.8
DMG6	2	3	0.8	1.2	0.8
DMG Control 1	0.9	0.5	0.2	0.6	0.4
DMG Control 2	0.2	0.4	0.3	0.3	0.4
Average	0.8	2.2	0.4	0.6	0.6